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MANAGING COMMITTEE OF  
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## ERRATA.

Vol. 5, No. 6, p. 388 (tenth line from foot), for "dissolved in 10 per cent. acetone," read "in ten per cent. solution in acetone" .. .. .	210
Vol. 6, No. 6, p. 345, Summary of KNAPP, line 5, for 14 read 4.	
Vol. 6, No. 7, p. 424, last line of page, for 4088 read 1088.	

# TROPICAL DISEASES BULLETIN.

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[No. 1.

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## TYPHUS.

CORBETT (C. H.). **Typhus Fever in Palestine 1913-14.**—*Brit. Med. Jl.* 1915. May 22. pp. 887-888.

The author describes the salient points of an epidemic of typhus in Palestine during 1913 and 1914. The epidemic broke out in the spring of 1913 and was extremely virulent; it first appeared in Jerusalem and later Hebron was swept with the disease. Towards the end of the year the number of cases diminished in the inland towns but increased in the coast towns, reaching the maximum in spring, 1914.

During this epidemic the author came to the following conclusions:—

The severity of the disease depends upon the age of the patient. Over twenty years of age the affection is much more severe, and is particularly dangerous over 30 or 35. The severity also depends upon the hygienic surroundings, for in the Jerusalem prison among about 180 patients there was a 50 per cent. death-rate, whilst in hospital cases the usual mortality is 20 per cent. The rash in typhus is reported not to extend on to the neck, but occasionally was observed to do so, though diffusely.

The infection seems to be transmitted by the body-louse and one patient became infected by unpicking a mattress which had been disinfected and exposed to the sun for some days. [In this case probably infected lice had survived and thus produced the infection.]

With regard to treatment good nursing is essential and a liberal supply of air-space, fresh air and, if possible, sunlight, are almost equally needed. Continuous sleeplessness must be combated with discretion and determination. Stimulants such as brandy and strychnine may be used during the days preceding the crisis, but digitalis is to be avoided. When pulmonary affections existed, injections of camphor were of great value. Injections of quinine and sodium sulpho-carbolate (the latter in 20 grain doses every four hours) undoubtedly modified the severity of the attacks.

The disease spread into Asia Minor in 1914, and crossing the Bosphorus reached Serbia and Austria.

E. Hindle.

MICHIE (Henry C.). **Mexican Typhus Fever.**—*Med. Record.* 1915. Feb. 6. Vol. 87. No. 6. pp. 214-218.

The author gives a summary of the present state of our knowledge concerning this disease and in addition adds notes on the biology and  
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life-cycles of the three species of lice infesting man, and means of getting rid of them. Incidentally he mentions that the body-louse (*Pediculus vestimenti*) does not breed at high temperatures and as a result is absent in such towns as Vera Cruz.

With regard to treatment the author believes that sodium citrate in full doses, or the Sternberg yellow fever treatment, would be beneficial. The latter consists of sodium bicarbonate 150 grains, mercury perchloride  $\frac{1}{4}$  grain, and two pints of water. Of this solution  $1\frac{1}{2}$  ounce is taken every hour. The amount of water taken should be pushed to the limit, probably best in the form of lemonade, to increase the elimination of toxins.

Prophylaxis consists in avoiding being bitten by infected lice and various methods are suggested for preventing the spread of epidemics.

"1. Cleanliness of the body and linen.

"2. Avoidance of native shacks, washerwomen, and association with dirty people in infected zones.

"3. If infested, prompt and radical means for the extermination of the insects should be instituted.

"4. Thorough inspection of all cases in typhus localities, regardless of their condition before admission to hospital.

"5. Scrupulous cleanliness in hospitals, with frequent inspections to the end of preventing lice from gaining headway in the building.

"6. In case lice are found, all linen should be boiled, the wards fumigated with hydrocyanic acid or dioxide, and the heads and bodies of the patients examined.

"7. If it becomes necessary to enter infected places, the person should not touch the bed, sit down, or lay down his hat or coat; he should step quickly, roll up the bottoms of the trousers, and search his clothing for lice after leaving the building.

"8. When a typhus case is admitted to the hospital, the patient must be most carefully examined for lice before being admitted to the ward. He should be placed in a bed most positively free from lice, and as an additional precaution, covered with a mosquito bar tucked in around the mattress.

"9. Should typhus develop in a command, a thorough search for the louse should be instituted immediately, examining as many of the troops as necessary, especially those men who were in intimate contact with the patient. If thought advisable, the contacts should be quarantined in a pediculus free place during the incubation period.

"10. Entering buildings, wherever possible, in typhus bearing localities should be avoided. If buildings must be used, new ones should be selected. The number of cases would be greatly reduced, however, by using buildings as new as can be found, and by thoroughly renovating them before being occupied."

In conclusion the author asks whether typhus may not possibly exist in a chronic state in some lower animal, and be accidentally transmitted to man through the bite of the louse or some other insect.

E. H.

ANDERSON (John F.). Typhus Fever. Its Etiology and the Methods of its Prevention.—*U.S. Public Health Reps.* 1915. Apr. 30. Vol. 30. No. 18. pp. 1303-1311.

A useful summary of recent additions to our knowledge of typhus, in the course of which the writer mentions that the virus in the blood is deprived of infectivity by drying for 24 hours or heating to 55° C.

for five minutes. All efforts at prevention are centred on the louse and these efforts may be broadly grouped under the following headings :

" 1. Measures for the reduction of lice infestation among the population in general.

" 2. The destruction of all lice and their eggs found on the bodies, clothing, bedding, and surroundings of all cases of typhus, typhus suspects and contacts.

" 3. The adoption of measures, by persons in the vicinity of cases of typhus, to reduce or prevent the possibility of their being bitten by lice.

" 4. Inoculation with the mild type of the disease (Brill's disease) by persons contemplating entering localities where the disease is prevalent. Should Plotz's work [see this *Bulletin*, Vol. 4. p. 488] be confirmed the use of a vaccine prepared from the typhus-fever germ may be substituted for this."

E. H.

HORT (Edward C.). **Typhus Fever.**—*Brit. Med. Jl.* 1915. Apr. 17. pp. 673-675.

This paper consists of a short summary of the present state of our knowledge of this disease. In the course of the historical sketch the author mentions the appalling ravages of this disease in Serbia during the spring of 1915. On March 31st no fewer than 3,000 fresh cases were recorded from Skoplje alone. In that part of the article devoted to the method of spread of the disease the writer advances the view that typhus may be conveyed by the urine of convalescing and chronic typhus carriers, as well as by the agency of lice. No further evidence in support of this theory is brought forward beyond HORT and INGRAM's publication last year [see this *Bulletin*, Vol. 4, p. 489] and BURNS's observations on an outbreak of typhus in Eriskey [see this *Bulletin*, Vol. 2, p. 1].

[In view of the fact that NICOLLE and CONSEIL have clearly shown that in the absence of lice typhus does not spread, it may well be doubted whether it is necessary to guard against possible infection by urine and the evidence in support of the latter mode of infection is very uncertain.]

E. H.

THOINOT (L.). **Le Typhus exanthématique.**—*Ann. d'Hyg. Pub. et Méd. Légale.* 1915. Jan. Vol. 23. pp. 6-56. With 4 charts.

Although containing nothing original this article constitutes an excellent summary of the present state of our knowledge of this important disease, especially during the present war. The article should be read by all desiring a more complete knowledge of this malady, its history, diagnosis, method of transmission, etc., all being fully discussed.

E. H.

LINDNER (E.). **Zur Epidemiologie und Klinik des Flecktyphus.** [The Epidemiology and Symptoms of Typhus.]—*Wien. Klin. Woch.* 1915. Mar. 25. Vol. 28. No. 12. pp. 315-316.

The establishment of camps for prisoners of war in Austria has been followed by the appearance of typhus, and the author adds some notes on the disease. In one camp of about 9,000 Russians, there were over 300 cases of typhus in less than a week and a number of the attendants contracted the disease.

The disease seems to be more fatal to these attendants, etc. (Germans and Hungarians) than to the Russians, for out of 54 of the former who contracted the disease 13 died, a mortality of 24 per cent. On the other hand in the above mentioned camp of Russians, although there were so many cases of typhus, there was not a single death.

The author then proceeds to discuss the reason for this difference in mortality. One reason may be the fact that typhus is more widespread in Russia than in Austria, and in any population the rarer the disease the higher is its mortality. Another possibility is that the prisoners who have been bitten for weeks, sometimes for months, by large numbers of lice acquire the virus in an earlier form, when its virulence is very slight, and thereby develop a relative immunity against the disease.

The possibility that the different races are differently affected seems very improbable in the present case and the author considers that the true explanation lies in one or both of the above mentioned theories.

E. H.

**PALTAUF (Rich.). Ueber das Vorkommen von Influenza bei Flecktyphus.** [The Appearance of Influenza with Typhus.]—*Wien. Klin. Woch.* 1915. Mar. 11. Vol. 28. No. 10. pp. 261-262.

The author in two days examined the bodies of six patients who had died of typhus in one of the prisoner-of-war camps. In all these cases signs of acute bronchitis were found in the lungs and microscopic examination showed the presence of the influenza bacillus. Cultures were made from four of these patients and the influenza bacillus isolated in order to confirm the microscopic examination.

The author then mentions that in many of the camps influenza precedes the development of typhus and that when the two occur together the patient usually succumbs. The frequent association of the two may partially explain the common idea amongst some of the older physicians that typhus may be carried in the air, although there is no evidence in support of this belief.

In conclusion the author points out that the use of masks is quite unnecessary, as the result of the Balkan war clearly demonstrated that in the absence of lice typhus does not spread and therefore it is only necessary to guard against the possibility of being bitten by these parasites.

E. H.

**BURNS (Wm. C.). Typhus Fever.** [Correspondence].—*Brit. Med. J.* 1915. May 1. pp. 784-785.

The writer refers to his previous article [see this *Bulletin*, Vol. 2, p. 1] and calls attention to an outbreak of typhus fever that occurred in an isolated district in Skye. This was reported on by Dr. DEWER, who traced the outbreak to a man who had been engaged in stripping the thatch from the roof of his cottage. He had lived in the house for years but several cases of typhus had occurred previous to his occupancy and it was thought that the infective agency had persisted in the thatch. The writer suggests that the bronchial secretion, often profuse, may contain the infection and, forcibly expelled by coughing, have lodged in the exposed thatch of the low cottage roof.

[From what is known of the nature of typhus, there is no evidence to support the view that the virus can exist for any length of time either in the air, in the thatch, among excreta, or in similar localities. All experimental evidence points to the fact that typhus is transmitted solely by the agency of lice, and it has been shown that in the absence of these parasites the disease does not spread. The above writer mentions that lice were greatly in evidence in his cases of typhus and it seems probable that the outbreak was the result of one of the patients coming in contact with a person either suffering from a mild form of the disease or harbouring infected lice.]

E. H.

**KLEMPERER (G.) & ZINN (W.). Zur Diagnose und Prophylaxe des Fleckfiebers.** [The Diagnosis and Prophylaxis of Typhus.]—*Therapie d. Gegenwart.* 1915. Feb. Vol. 56. No. 2. pp. 41–45.

The author describes in detail the history of the case of Dr. George JOCHMANN, who became infected with typhus in December, 1914, and died the same month. JOCHMANN himself believed that typhus could be transmitted from one person to another without the presence of any lice or other carrier, and in his own case was of the opinion that the infection had been direct. The author points out the probability of lice being responsible for the infection in this, and all other cases, and concludes with notes on methods of destroying lice. As a prophylactic agent against infection with lice, he recommends rubbing oneself with a 15 per cent. alcoholic solution of anisol. In addition naphthalene is a very efficient repellent [see below, p. 11].

E. H.

**WEIL (E.) & SPAET (W.). Die Bedeutung der Widal'schen Reaktion für die Diagnose des Flecktyphus.** [The Importance of the Widal Reaction in the Diagnosis of Typhus.]—*Wien. Klin. Woch.* 1915. Feb. 25. Vol. 28. No. 8. pp. 207–208.

The author mentions three cases which presented all the features of typhus such as the typical exanthem, etc., and yet the blood of each patient gave a positive Widal reaction with the typhoid bacillus and a negative reaction with paratyphoid. The blood and faeces of each patient were then examined for the presence of the typhoid bacillus, although from the clinical symptoms the physician, who was familiar with typhus, had no doubt that they were suffering from this disease. In one of the patients the first three bacteriological examinations of the blood were negative, but the typhoid bacillus was obtained in the fourth attempt. This patient died and was found to have been suffering from unmistakable typhoid fever. Similar results were obtained with the other patients and the author calls attention to the difficulty of distinguishing certain cases of typhoid from typhus and in all doubtful cases recommends the employment of the Widal reaction.

E. H.

**CAMERON (James).** **Typhus Fever.** [Correspondence].—*Brit. Med. Jl.* 1915. May 1. p. 785.

The writer calls attention to the fact that very shortly after Widal's reaction for typhoid was published he examined the sera of a number of typhus patients, during an epidemic in West Lothian, and several gave the Widal reaction.

These observations were published in the now defunct *Scottish Medical and Surgical Journal*, and at the time seemed to throw doubt on the specificity of Widal's reaction. They have since been confirmed by WILSON.

E. H.

**HORT (Edward C.).** **Typhus Fever.** [Correspondence].—*Brit. Med. Jl.* 1915. May 8. p. 826.

The author calls attention to the fact that CAMERON was the first to show that *B. typhosus* is sometimes emulsified by the serum of typhus patients. He then proceeds to refer to BURNS'S observations [see above, p. 4] and suggests that facilities for the disinfection of excreta and sputum should be provided in all cases of typhus as precautions, in addition to the essential warfare against lice.

E. H.

**MAXWELL (Ernest J.).** **Open-Air Treatment of Typhus Fever.** [Correspondence].—*Brit. Med. Jl.* 1915. Mar. 20. p. 528.

The writer mentions that in Tripoli city during the war the Italians treated cases of typhus mostly in huts or special tents. This method seems to be much better than using ordinary wards, as a tent or a hut can be more easily cleared of vermin; besides there is better ventilation and a free current of air is supposed to be a great safeguard. At the North Africa Mission Hospital in Tangier they lost on two occasions both the doctor and the nurse through admitting a typhus case to the ward.

The writer advises, therefore, that typhus cases should be treated in tents and, if that is not possible on account of the weather, in special huts which could be destroyed afterwards.

E. H.

**HEAD (George Douglas).** **A Case of Typhus Fever.**—*Jl. Amer. Med. Assoc.* 1915. Mar. 20. Vol. 64. No. 12. p. 991. With 1 chart.

The author records a case of typhus fever occurring in May, 1914, in a male patient 50 years old, living at Minneapolis, Minn. This is the first case recorded from Minnesota.

E. H.

**UMBER (F.).** **Flecktyphusartiger Verlauf von Genickstarre.** [Cerebro-spinal Meningitis resembling Typhus].—*Med. Klinik.* 1915. Feb. 14. Vol. 11. No. 7. pp. 187-188.

The description of a case which was diagnosed as typhus, but after death was found to have been a case of cerebro-spinal meningitis. The early symptoms of the patient closely resembled those of typhus and the hospital officials had no doubt as to the correctness of this diagnosis until the post mortem revealed the true nature of the disease.

E. H.

NICOLLE (Charles), BLANC (G.) & CONSEIL (E.). **Quelques points de l'étude expérimentale du Typhus exanthématique.** [Correspondence].—*C. R. Acad. Sci.* 1914. Nov. 9. Vol. 159. No. 19. pp. 661-664.

The authors have conducted further experiments on typhus with the object of clearing up some of the obscure points concerning its etiology and transmission. In order to determine the exact incubation period after which lice fed on infected blood become infective, a number of these insects that had been fed on an infected monkey were ground up at intervals of one to ten days and injected into monkeys and guinea-pigs. Out of 11 experiments 8 (6 monkeys, 2 guinea-pigs) inoculated with lice one to seven days after the infected feed all gave negative results, whilst 5 animals (4 monkeys, 1 guinea-pig) inoculated nine to ten days after the infected meal all became infected with typhus.

These results show that lice are not infective before the eighth day, but are constantly infective on the ninth or tenth days.

Similar experiments were performed with the faeces of lice that had fed on a typhus patient. The results show that the faeces of such lice become infective after an incubation period of nine to ten days, and therefore the excrement of these insects may serve as a source of infection in addition to their bites.

Two experiments were made in order to test the possibility of hereditary infection in the louse but both gave negative results, and the authors suggest that the one positive result obtained by Edm. SERGENT and his collaborators might be explained by the possibility of the eggs being contaminated by faeces from infected lice, or even by the blood from the patient.

The coccobacilli described by Edm. SERGENT and his collaborators, as occurring in the intestine of lice fed on typhus patients, was found in 5 per cent. of lice collected in districts in which typhus did not occur.

Two attempts to filter the virus obtained by grounding up 140 and 175 infected lice respectively both gave uncertain results and therefore the filtrability of the causative agent of this disease cannot be regarded as certain.

In conclusion the authors state that guinea-pigs are quite as susceptible to typhus as monkeys and the virus maintained its virulence after passage through twelve guinea-pigs. These animals can be made less resistant to the disease by mixing the virus with some heterogenous serum (e.g., eel or lizard).

In the blood and organs of infected guinea-pigs not any organism could be detected.

E. H.

NICOLLE (Charles), BLANC (Georges) & CONSEIL (E.). **Nouvelles Recherches expérimentales sur le Typhus exanthématique pratiquées à l'Institut Pasteur de Tunis pendant l'Année 1914.**—*Arch. Inst. Pasteur de Tunis.* 1914. Dec. 1. Vol. 9. No. 2. pp. 84-121. With 17 charts.

The greater part of this article is merely a more detailed account of the results previously published in the *Comptes Rendus de l'Académie des Sciences* which are reviewed above. In addition it is stated that the spleen of infected animals is virulent but not in any greater degree than the blood.

The authors find that a previous attack of spirochaetosis sometimes protects monkeys against a subsequent inoculation of typhus, for out of eleven monkeys that had recovered from relapsing fever and were then inoculated with the virus of typhus, two did not become infected and one showed a slight rise in temperature after an abnormally long incubation period; the remaining eight all became infected with typhus after the usual incubation period. This resistance may perhaps be due to the action of the blood elements introduced into the circulation when the animals were inoculated with the spirochaetes.

Further attempts to infect rabbits, dogs and cats with typhus gave entirely negative results.

E. H.

NICOLLE (Charles). *Quelques points concernant le typhus exanthématique.*—*Bull. Soc. Path. Exot.* 1915. Apr. Vol. 8. No. 4. pp. 160–161.

During the year 1914 not a single case of typhus has been contracted within the town of Tunis although three were imported, one from Algeria and two from Morocco.

The virus of this disease has been kept going in the laboratory from May and June 1914, up to the date of the communication (March 10th, 1915). The first virus obtained in May has had the following passages: monkey, guinea-pig, monkey, lice, monkey, lice, monkey, lice, monkey, sixteen successive guinea-pigs, monkey, guinea-pig.

The second virus, obtained in June, was first passed through a monkey, then successively through twenty-two guinea-pigs. At the sixteenth and at the twenty-second passage, the blood was shown to be virulent for monkeys.

In order to keep the virus in the laboratory it is advisable to use only adult guinea-pigs and to inoculate two or three at each passage, and to take the temperature carefully every morning and evening. The temperature curve is the only sign of infection in this animal. Successive passages through the guinea-pig do not seem to increase the activity of the virus towards the guinea-pig itself, but seem to increase its virulence for monkeys. Four years ago the author showed that the inoculation of serum from an infected animal during the febrile period is harmless in small doses for man. In addition the following experiment was made:—0.5 cc. of the serum of an infected guinea-pig collected during the febrile period, centrifuged and kept for a short time in the ice-chamber, was inoculated subcutaneously into a man. Ten days later a second inoculation of 1 cc. serum was administered. Ten days later a third inoculation of 1 cc., but this time the serum was shaken so that it contained blood cells. These three inoculations produced no trouble and ten days after the last the patient was inoculated with 3 cc. of blood from an infected guinea-pig. Although under observation forty days no febrile symptoms were noticed.

It seems possible therefore that repeated inoculations of small doses of the virus are capable of producing immunity against typhus, and might perhaps be used as a preventive vaccination against this disease.

E. H.

GHON (A.). **Ueber die neuen diagnostischen Hilfsmittel bei Flecktyphus.** [On New Aids in the Diagnosis of Typhus.]—*Prager Med. Woch.* 1915. Jan. 7. Vol. 40. No. 1. pp. 5-7.

The author reviews recent literature on this subject and calls especial attention to two new aids in the diagnosis of typhus, viz:—the examination of the blood and the histological character of the exanthem. The presence of diplo-forms in the leucocytes and certain peculiarities in the staining reactions of these cells after vital staining with Azur II are said to be characteristic of typhus, as shown by PROWAZEK [see this *Bulletin*, Vol. 2, p. 640]. Moreover, FRAENKEL has shown that the histological character of the typical exanthem is peculiar to typhus [see this *Bulletin*, Vol. 3, p. 564].

The paper contains nothing original.

E. H.

GHON (A.). **Einige von den Erfahrungen über diagnostischen Hilfsmittel bei Flecktyphus.** [Some Observations on the Aids in the Diagnosis of Typhus.]—*Prager Med. Woch.* 1915. Feb. 25. Vol. 40. No. 3. p. 82.

The author refers to the two methods recommended in his previous paper [see above], and as a result of further experience states that the cytological and bacteriological or serological examination of the blood are the only diagnostic aids of any value. Leucocytosis combined with degenerative alterations in the leucocytes and negative bacteriological and serological examinations is characteristic of typhus, as the author has found from examining several cases of this disease. For the bacteriological examination of the blood it is essential that it should be collected aseptically and that good films should be made, as badly prepared films are worthless.

E. H.

ANDERSON (John F.). **Laboratory Methods in the Diagnosis of Typhus Fever.**—*Amer. Jl. Pub. Health.* 1915. May. Vol. 5. No. 5. pp. 456-457.

A very brief summary of methods of use in the diagnosis of typhus. They may be divided into those of value (a) because of negative findings and (b) because of positive findings.

(a) "Of special value are a positive Widal reaction [but see above p. 6], positive blood or feces cultures showing the presence of organisms of the typhoid group, or positive cultural and microscopic findings from the fluid obtained by spinal puncture. Should any of the above findings be obtained, typhus fever may be excluded and for that reason such studies should be made when it is not possible to carry out the procedures to be discussed under (b)."

(b) Either guinea-pigs or monkeys are inoculated with blood and blood cultures from the patient. It is sufficient to inoculate two guinea-pigs of about 500 gm. weight with 3 to 4 cc. of defibrinated blood taken from the patient during the febrile period. The rectal temperature of the animals should be taken twice daily and the temperature plotted on a chart. Observations should be continued for at least three weeks.

If PLOTZ's results should be confirmed this will be a most valuable laboratory method, comparable with that of blood cultures in typhoid fever.

E. H.



MENSE (C.). **Zur Frage der Bekämpfung des Fleckfiebers und der Läuse.** [The Problem of combating Typhus and the Louse.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1915. Mar. Vol. 19. No. 6. pp. 172–176.

After mentioning the fact that typhus is transmitted by the agency of lice the writer proceeds to discuss various methods of destroying these insects.

It is obvious that great care must be taken to free from lice the clothes and linen of all typhus patients. One method is to disinfect the whole room containing the clothes with sulphur dioxide and it is best to employ cylinders of the gas, which can be bought quite cheaply. It is necessary to produce a concentration of 6 to 8 per cent. in order to disinfect a room and, in order to kill all lice, an exposure of at least four hours is essential. Salfarkose, a patent preparation, can be used instead of  $\text{SO}_2$ . Patients who are infested with head and body lice should be shaved naked and rubbed all over with grey ointment.

Aetherial oils are efficient louse repellants and it is suggested that medical attendants and others should use Senfol, anisol, or even naphthalene to prevent infection.

With regard to fumigation it is pointed out that KISSKALT found that exposure to steam for five minutes killed all lice, whilst sulphur dioxide required 24 hours. Moreover dry heat at  $70^\circ \text{C}$ . kills all lice and their eggs in ten minutes. On the other hand an exposure to  $-5^\circ \text{C}$ . does not kill either the lice or their eggs.

A 5 per cent. mixture of naphthalene with vaseline, and also benzine and ether are toxic agents. A mixture of bergamot oil (15 per cent.) in alcohol, is also a very efficient agent against lice and fleas.

Finally the author mentions a lotion which he has found most effective against all three varieties of lice in the egg and all stages of development—one part of mercuric chloride and 299 parts of Acetum vini which, if necessary, can easily be prepared from ordinary sublimate tabloids and vinegar. This mixture should be rubbed into the hair and over the skin of infected persons. It is sometimes liable to produce inflammation of the skin, in which case an ointment, such as 10 per cent. salicylic vaseline, should be used after the above.

This lotion is much more effective than grey ointment, as the latter does not kill the eggs of the lice.

E. H.

LAVERAN (A.). **Au Sujet de la Prophylaxie du Typhus dans les Armées en Campagne.**—*C. R. Acad. Sci.* 1914. Nov. 9. Vol. 159. No. 19. pp. 640–641.

The author calls attention to the part played by lice in the transmission of typhus, and in view of the possibility of this disease being introduced amongst the soldiers at the front, insists upon the necessity of combating any outbreaks of phthiriasis that may occur among the men.

E. H.

BLASCHKO (A.). **Zur Prophylaxe des Flecktyphus.**—*Deut. Med. Woch.* 1915. Jan. Vol. 41. No. 1. p. 12.

The prophylaxis of typhus can only be effected by preventing pediculosis, and therefore any means of effectively destroying both body and head lice will arrest typhus epidemics.

The author calls attention to the fact that naphthalene is a very efficient agent against body-lice, either in the form of a 5 per cent. mixture with vaseline, or in the powder. All soldiers should be provided with about 30 to 50 gms. of powdered naphthalene and when any itching due to lice is noticed the parts affected should be well rubbed with naphthalene mixed with vaseline. In addition about half a tea spoonful of the powder should be scattered round the neck at the top of the shirt or better still two bags of the powder can be tied round the neck in order to prevent any of the lice passing from the body to the head. A little of the powder scattered in the bed also prevents the body lice living in this locality.

With regard to the head lice, the best method of preventing their occurrence is to insist upon the hair being closely cut with the machine.

[The efficacy of this simple remedy should make it extremely useful at the front in preventing the spread of any pediculosis.]

E. H.

NICOLLE (Charles) & CONSEIL (E.). **Nécessité des Mésures à prendre pour préserver nos Armées en Campagne des Typhus Exanthématique et Récurrent.**—*Presse Méd.* 1915. Jan. 21. No. 3. pp. 18-19.

The authors call attention to the importance of protecting the soldiers from being infested with lice, as both typhus and relapsing fever are transmitted solely by the agency of these parasites. In Tunis typhus has been practically exterminated by preventing the spread of the disease, this being effected solely by combating the lice which transmit the infection. Thus in 1909 there were 856 cases; 1910, 148; 1911, 180; 1912, 22; 1913, 6; and in 1914 only three cases, all of which were imported. These results show what can be accomplished in the case of typhus, and it is to be hoped that by adopting preventive measures against lice, epidemics may be prevented in the Allies' armies.

E. H.

FRISCH (Johann). **Zur Verhütung der Infektion mit Flecktyphus.** [On the Prevention of Infection with Typhus.]—*Wien. Klin. Woch.* 1915. Apr. 8. Vol. 28. No. 14. pp. 367-368.

The writer strongly urges the importance of fresh air in cases of typhus and recommends that the windows and doors should be left wide open in all typhus wards or rooms containing cases. In addition he asserts his belief in the old theory that typhus may be spread by breathing the air in badly ventilated typhus wards, but no evidence is brought forward in support of this statement.

E. H.

**KRAUS (R.) Zur Frage der persönlichen Prophylaxe gegen Typhus exanthematicus.** [The Problem of Personal Prophylaxis against Typhus.]—*Wien. Klin. Woch.* 1915. Mar. 25. Vol. 28. No. 12. pp. 314–315.

The author advances the opinion that typhus may be contracted by breathing the air of infected patients and advocates for doctors and nurses in typhus hospitals the use of masks similar to those used during the plague epidemic in Manchuria.

E. H.

## TYPHOID AND PARATYPHOID IN THE TROPICS.

**GREIG (E. D. W.). Enteric Fever in India.**—*Proc. Second All-India Sanitary Conference held at Madras November 11th to 16th, 1912.* Vol. 3. Research. pp. 312-315. 1913. Simla: Government Central Branch Press.

In the years 1906-1908 Major Greig and his colleagues in the Indian Medical Service carried out on behalf of the Government of India an enquiry into the causes of enteric fever among the troops in India, and their results included the well-known investigation into the problem of the typhoid carrier and the clear distinction between typhoid and paratyphoid fevers. On their recommendation the Government established two depots, one at Naini Tal and the other at Wellington, for the segregation and investigation of enteric convalescents. In this paper Greig collects some of the opinions already published by others on the influence which the two depots have exerted on the prevalence of the disease in the Indian army. This is necessarily difficult to estimate with any degree of accuracy. Enteric had undoubtedly been diminishing before they were established. Colonel FIRTH for example gives the number of paratyphoid and typhoid cases in 1897 as 2,050 and in 1907 as 1,012, and antityphoid vaccination has certainly contributed to the fact that for 1910 and 1911 the figures according to FIRTH are 335 and 274. But there can be no doubt that the segregation of the temporary carrier as well as the chronic carrier must have effected a real and increasingly important reduction in the exposure to infection. On this there is general agreement among Indian military medical authorities, and the collection of carriers into these depots affords an opportunity of study all the more valuable in that it is not at present available in civilian practice.

J. Henderson Smith.

**CLARK (Francis). Twenty Years of Enteric Fever in Hongkong.**—*Far East. Assoc. Trop. Med. C. R. Trois. Congrès Biennal, Saigon (1913).* 1914. pp. 185-194.

The population in such a town as Hongkong is fluctuating and difficult to assess in the intercensal periods, but approximately from 1898-1912 there were 10,000 Europeans and Americans, 300,000 Chinese, and 8,000 other Asiatics annually present. The incidence and mortality per 1,000 of enteric fever on these classes of the population in quinquennial periods was as follows:—

	Europeans and Americans.		Chinese.		Other Asiatics.	
	Case-Rate.	Deaths.	Case-Rate.	Deaths.	Case-Rate.	Deaths.
1898-1902	3.64	0.86	0.08	0.07	1.02	0.58
-1907	4.27	1.09	0.07	0.06	1.53	0.15
-1912	2.70	0.48	0.13	0.09	1.34	0.22
1898-1912	3.52	0.80	0.08	0.07	1.30	0.30

The average case-mortality among Europeans for the 15 years was 22·8 per cent.; among Chinese 78·5 per cent. (steadily falling from 87·8 per cent. in the first period to 71·4 per cent. in the third owing to the establishment of many hospitals and dispensaries), and among other Asiatics 23·4 per cent.

The risk of infection amongst whites is shewn to be about eight times as great as it is in Surrey, England, and the chance of recovery slightly less. The difference in the incidence on whites and Chinese is very remarkable. No doubt many cases amongst the Chinese go unrecognised, but Clark believes that during the 10 years from 1903 not many deaths can have escaped recognition, and the death-rate for that period was 0·076 per cent. amongst the Chinese as against 0·78 per cent. in whites. It has been suggested that the low incidence is due to unrecognised attacks in childhood conferring immunity and it appears that a high proportion of all Chinese deaths from enteric occur in children under 5 years, e.g. in 1900, 5 out of 39; in 1904, 32 out of 55; in 1912, 43 out of 88. But typhoid accounts for only a very small proportion of the total deaths under 5 years, too small to support a theory of general typhoid infection in infancy, unless it is of improbably low virulence. The prevalence of dysentery makes different diet and habits of feeding an unlikely explanation, and there is no real support for the alleged difference in the lymphatic development or unusual prevalence of lactic acid bacilli in the gut of the Chinese. Clark is inclined to accept the view that there is a natural or racial immunity to the disease. He finds no definite climatic or seasonal prevalence [but the numbers are perhaps too small to bring out the point clearly.]

Infection is, he thinks, chiefly due to eating raw fruit or vegetables. The Chinese system of obtaining manure is to fill a pit with water, to which he adds human faeces and urine, and the highly nitrogenous supernatant fluid, which must always contain some recent excrement, is used to spray his vegetable and fruit garden. The only safe rule for Europeans is to avoid all raw vegetables and ground fruit, e.g. strawberries.

In discussion Dr. CHASTANY remarked that at Shanghai much of the prevalent low fever is probably typhoid, and that there is some reason for believing that persons vaccinated against typhoid escaped.

J. H. S.

**GUTIERREZ (Perpetuo). Typhoid Fever in the Philippines.**—*Philippine Jl. of Sci.* Sect. B. Trop. Med. 1914. Aug. Vol. 9. No. 4. pp. 367–378.

A clinical study of 125 cases of Filipinos treated in the Philippine General Hospital at Manila, and of interest as a comparison of the disease in the tropics with the better known picture of temperate climes. Judging by the hospital records the disease has increased of recent years, and the admissions show the usual seasonal maximum in September–November, the usual preponderance in males, and the usual maximal incidence, in both sexes between the ages of 15 and 25. In Oriental countries such as India, there is recorded an unusually high incidence in children (e.g., ROGERS in Calcutta, 41·6 per cent. of cases were under 15) but in the present series less than 10 per cent. were found under 15 years and NICHOLAS has already recorded a similar

figure for the Philippines. The clinical picture is on the whole the familiar one. The classical temperature curve is rarely met with; it does not go so high and the fastigium is not so prolonged. Only one case reached  $41^{\circ}\text{C}$ ., and only 43·4 per cent reached  $40^{\circ}$ , and a noticeable feature was the frequency of remissions. In nearly 10 per cent. the curve was wholly irregular; recrudescence occurred in 4·3 per cent., and relapse in 8 per cent. of the cases. Abortive cases, lasting only 15 days at most, formed 13·8 per cent. These were generally mild, and in ordinary practice would probably have escaped recognition. In such cases the following points should be borne in mind. Headache at the outset is usually a pronounced symptom, sometimes intense, but more commonly a dull ache at the vertex; the pulse rate is slow—80–90—considering the fever ( $39^{\circ}\text{F}$ . or so); the spleen is enlarged to percussion, and the typhoid tongue is fairly constant. In the whole series constipation was more frequently present than not, continued diarrhoea occurring only in 9 cases, and transient diarrhoea in 21. Haemorrhage and perforation were commoner than usual. The mortality was high. Excluding 10 cases which were hopeless from the time of admission, death occurred in over 13 per cent. of the cases—a rate which, while not so high as some of those recorded in other tropical countries, may perhaps be due to the generally poor conditions of life among the Filipinos. Blood-cultures were positive in 8 out of 13 made before the 6th day, and in 12 out of 32 made after the 6th day.

J. H. S.

**WILLETS (David G.).** **Widal Reactions among Healthy Adult Filipinos.**  
—*Philippine Jl. of Sci.* Sect. B. Trop. Med. 1914. June. Vol. 9.  
No. 3. pp. 253-257.

Willets found 4 per cent. of young adult, apparently healthy, Filipinos to give a definite positive Widal reaction, and 16·1 per cent. to give a distinct agglutination reaction not strong enough to be called fully positive—these figures being based on the examination of 300 individuals. In 1911 CHAMBERLAIN found only 2·9 per cent. positive in 307, and Willets is inclined to connect the increase in the percentage with the increasing prevalence of typhoid in the Philippines.

J. H. S.

**BERNARD.** **La Fièvre typhoïde au Maroc Occidental en 1911.**—*Arch. de Méd. et de Pharm. Milit.* 1914. Jan. Vol. 63. No. 1. pp. 1-56.  
With 2 figs.

This is an account, written by a medical officer who accompanied the troops, of the epidemic in the French expeditionary force of 1911. It is a melancholy record, of particular value to military authorities, as a modern instance of the havoc typhoid can produce when sanitary measures for whatever reason are insufficiently enforced. So far as concerned the country in which the operations took place there was no reason to anticipate any severe outbreak. Typhoid was already present in stations like Casablanca and Chaouia, but the route through which the columns had to march lay largely through desert where the hot dry sand rapidly destroys dangerous contamination, and was supplied with good pure water, and in spite of the dust and flies strict sanitary supervision might have kept under control any outbreak of

the disease. Yet of the troops disembarked in Morocco at least one-tenth were struck down by undoubted typhoid, and of these 16.1 per cent. died. Accurate figures of the incidence of the disease cannot be obtained. The total given (2,471 in all) is almost certainly too small. It includes only undoubted cases treated as such. Many mild cases, especially in the earlier days of the epidemic, were returned as febrile gastric disturbance, paludism and the like, and very many probably escaped recognition at all with, as one result, a raising of the apparent mortality rate. In this, as has been noted in other campaigns, ambulatory cases were numerous, some ending with dramatic suddenness, but many returning to the ranks after a short period of slight sickness, and many probably never fell out at all.

The arriving troops brought the disease with them, and apparently each unit supplied its own infective focus. There was no real reason to suppose that there were local sources infecting the detachments of troops in succession as they came into occupation. Rather the whole column was infected and carried its disease with it in every part, and from one stage of the route to the next. Every circumstance favoured its spread. The military requirements demanded haste; the country was new and hostile, and it proved impossible to take in advance the measures desirable to maintain the purity of the water for arriving troops, or to prevent them drinking water unboiled or unfiltered. There was ample provision of filters, but baggage was frequently delayed, the men would not wait for the slow process of providing pure water at every halt, and often there was no material for fires to boil. Bernard's impression, however, is that the disease was spread mainly from man to man, and that water contamination played only a minor part. Dust and the incessant plague of flies must have had some share in dissemination, especially as the system of disposal of excrement appears to have been extremely faulty, at least in practice. There was, however, undoubtedly a large number of cases constantly excreting typhoid bacilli for weeks, unrecognised or only recognised late in their attack, and the close contact of camp life under conditions where personal cleanliness was habitually and often necessarily impossible gave every chance for direct spread within a unit, while the military arrangements produce a continual intercourse of one unit with another which enlarged the field of contact for any single infected individual.

The epidemic began towards the end of May, soon after the troops began to disembark, reached its height on the line of march in July (in Casablanca not till two months later), and died out quickly thereafter in the original troops, though reinforcements as they came continued to be attacked. The native troops were almost exempt, the white troops alone suffering severely. Bernard gives an instance of one battalion numbering 835 men in May, which by August 25th contained only 302, of whom not more than 214 were fit for active service. The so-called "Colonial" troops (white) suffered most heavily, possibly, suggests Bernard, because of the less stamina of men drawn from town life and unhealthy surroundings in youth. They, like the others, had not been vaccinated, and we may hope that this expeditionary force of 1911 will be the last occasion on which typhoid will play its formerly invariable part in military campaigns. The similar expedition of 1912 with vaccinated troops had no such epidemic, except in one unvaccinated division.

J. H. S.

DUDLEY (Sheldon F.). **Note on a Typhoid Carrier.**—*Jl. R. Naval Med. Service.* 1915. Jan. Vol. 1. No. 1. pp. 63-65.

An account of a ship's cooper, brought by his occupation into contact with food, who had enteric fever in 1898 and was recognised as a carrier in 1914. During this period cases, which together make up a total of 53, occurred in every ship to which he was sent while he was on board, even when the rest of the fleet was practically free from enteric—e.g., in the "Implacable" six cases occurred in 1909 during his stay on the ship, at a time when there were only two cases in the rest of the Atlantic fleet amongst some 9,000 men. He was finally discovered after 28 cases had occurred in the "Formidable," which could not be accounted for in any other way. He gave a positive Widal test, the urine was sterile, and the bacillus appeared only intermittently in his faeces.

J. H. S.

GOODWIN (W. R. P.). **A Case of Paratyphoid Fever "A" with Relapse.**—*Jl. R. Army Med. Corps.* 1914. Aug. Vol. 23. No. 2. pp. 205-207. With 2 charts.

A case of interest as showing a typical relapse after 14 days of convalescence, the blood giving positive cultural reactions, in the occurrence of a roscolar eruption during the relapse, and in the absence of tonsillitis and tenderness over the region of the gall-bladder, and the absence of enlargement of the spleen. It is noteworthy that the organism isolated during the relapse, though apparently giving the sugar reactions of *B. paratyphosus* A (this is not directly stated), was agglutinated by specific serum in dilution of 1 in 10, and not at all with typhoid serum, suggesting a possible variation in the organism.

J. H. S.

CASTELLANI (Aldo). **Brief Note on a Case of Triple Infection: Typhoid, Paratyphoid "A", and Paratyphoid "B".**—*Jl. Trop. Med. & Hyg.* 1915 Feb. 15. Vol. 18. No. 4 pp. 37-38. With 2 charts.

Record of a case in which all three organisms were isolated from one sample of faeces, and on two other examinations, as also on two examinations of urine, both *B. typhosus* and *B. paratyphosus* A were obtained. The patient's serum agglutinated all three organisms. Cases of double infection have been recorded several times, but this is apparently the first of triple infection.

J. H. S.

BOURKE (E. A.), EVANS (Idris D.) & ROWLAND (Sydney).—**Preliminary Observations on the Use of an Autogenous Living Vaccine in the Treatment of Enteric Fever (Six Cases).**—*Jl. R. Army Med. Corps.* 1915. Jan. Vol. 24. No. 1. pp. 5-12. With 6 charts.

The writers have treated five cases of typhoid and one of paratyphoid B infection with living autogenous vaccine, not only without ill results but with apparently excellent benefit. In each case a 5 cc. sample of blood was added to 1 per cent. sodium taurocholate and incubated ;



from this a broth culture was prepared and the organism identified, and then a fresh broth culture was made, counted and used direct subcutaneously as the vaccine. The initial dose given was 60 million of the paratyphoid B, and from 100–200 million of the *B. typhosus*. Three or four doses were given, rising in one case to 300 millions. Local reaction was less than that usually obtained after prophylactic injection, the general reaction was marked and might be accompanied by profuse perspiration.

J. H. S.

**MACARTHUR (W. P.).** *Note sur soixante trois cas successifs de Fièvre Typhoïde traités par le Vaccin.*—*Bull. Soc. Méd. de l'Île Maurice*. 1914. Apr.-May-June. Vol. 32. 2<sup>e</sup> Sér. No. 36. pp. 31–34.

The patients dealt with here were mostly brought to Macarthur as cases of doubtful fever, and his procedure was to make a blood culture, and also at once inject a stock typhoid vaccine if typhoid was a possibility, and then go on to autogenous vaccine if the culture was positive. The organism was recovered 58 times from the blood (in two cases it was not isolated at all, and in three only from the faeces), and out of 14 attempts between the 14th and 24th days of the disease it was got 12 times, a rather unusually long duration of septicaemia. No ill effects in any case were observed. On the other hand the benefit in early cases was striking. The severity of the attack was undoubtedly diminished, not so much by reduction of the fever (though sometimes there was a regularly marked drop after each injection), as in the absence of headache, lumbar or abdominal pains, and the other disturbing accompaniments of the usual disease. The effects were much less marked in cases in which the treatment by vaccine was not begun till after the 14th day of the disease. These numbered 11 cases, and all the complications and relapses, of which there were two, observed in the whole series, occurred in this group with the exception of one fatal broncho-pneumonia. The total mortality was 3·1 per cent. The doses given began with 150–300 millions and were increased every two or three days, till in one case as many as 1,500 millions were given.

J. H. S.

**ICHIKAWA (Sadakichi).** *The Abortive Treatment of the Typhoid and Paratyphoid.*—*Sei-i-Kwai Med. Jl.* 1914. Dec. 10. Vol. 33. No. 12. (Whole No. 394). pp. 73–81. With 8 charts. (The Original in No. 21. Vol. 28 of the *Jl. Tokyo Med. Assoc.*).

Ichikawa employed a vaccine prepared by sensitising typhoid bacilli with the serum of convalescent typhoid patients. Ten loops of young culture of typhoid are mixed with 10 cc. of serum, and after 5–6 hours contact at 37° the bacilli are washed in salt solution and suspended in 100 cc. saline containing 0·3 per cent, carbolic, and well shaken. For use 0·5 cc. of this was added to warm saline and slowly injected into a vein. As a rule shortly after the injection a rigor developed and the temperature rose (perhaps to as high as 40·7° C., usually not so high). This rise was followed by a sharp fall, which in most cases reached normal and stayed there. In some cases the

temperature might rise again, but was less high and more intermittent than before, and a repetition of the injection again brought it down. Exceptionally a third dose might be required. In 87 cases treated in this way he had a mortality of 11 per cent., a marked improvement on the 30 per cent. mortality usually obtained in the hospital where he worked, to which only severe cases are admitted. Of the fatal cases two were hopeless on admission, and the rest died from intervening complications. He observed a tendency to haemorrhage after the injection, but it was never serious, but he urges caution in cases of pregnancy or weak heart-action. In seven cases of infection with paratyphoid B he used the same typhoid vaccine and with the same success. Given subcutaneously (23 cases) the results were more irregular and uncertain.

J. H. S.

VON KORÁNYI.—Budapest. **Zur Vakzinebehandlung des Typhus abdominalis.** [Vaccine Treatment of Typhoid]—*Wien. Klin. Woch.* 1915. Jan. 28. Vol. 28. No. 4. pp. 85–86.

Korányi reports briefly on 29 cases treated with a vaccine prepared by Ichikawa's method of sensitising the organisms with convalescent serum [see above]. Of this 0.3 cc. was found to be too small a dose and 0.7–0.8 cc. too large. Twenty-four received 0.4–0.5 cc., and all showed the rigor and usual fall of temperature, even to much below normal. Seven recovered with a critical fall, three were unchanged, seven improved and three recovered with a short lysis. The duration of the disease before vaccination appeared to be of much importance; the earlier the treatment, the better the results. He regards the method as an undoubted improvement in treatment.

J. H. S.

DANYSZ (J.). **Essais de Chimiothérapie dans la Fièvre paratyphoïde expérimentale.**—*C. R. Soc. Biol.* 1915. Jan. 8. Vol. 77. No. 33. pp. 559–561.

Danysz determined that the always fatal dose for white mice of paratyphoid bacilli [A or B?] was 20–30 bacilli when introduced subcutaneously, but that 50,000 were necessary when introduced into the mouth through a tube, and over a million if given on bread. Small amounts of the phosphates or cacodylate of calcium, given subcutaneously 1–3 days before, would protect against a certainly fatal dose given by the mouth. Small quantities of antiseptics, such as salts of mercury, silver, copper, arsenobenzol, on the other hand, reduced the resistance. He suggests that it might be possible to apply this to man.

J. H. S.

CARNOT (P.) & WEIL-HALLÉ (B.). **La Biliculture au Cours de la Fièvre Typhoïde.**—*C. R. Acad. Sci.* 1914. Nov. 30. Vol. 159. No. 22. pp. 749–752.

Bile was obtained from the patient in one of two ways, either (1) by withdrawing the stomach-contents an hour after the ingestion of 150 gm. sterile olive oil, the oil having induced pyloric regurgitation

of bile ; or (2) by inducing the patient to swallow a small open glass bulb attached to a slender rubber tube 1 metre long ; after 3-4 hours the bulb passes the pylorus into the duodenum, and aspiration on the tube brings up a clear yellow fluid, largely bile, from which cultures were made. At the beginning of the fever and during the whole of the septicaemic period (which, the writers are inclined to think, is longer the greater the severity of the attack) the bile contains no typhoid bacilli. With their disappearance from the blood the organisms appear in the bile, and positive results are obtained throughout the rest of the attack, the convalescence and often after clinical recovery. In favourable cases they may disappear by the 30th day of the disease, but the authors found them still present as late as the 94th day. They claim that a higher percentage of positive results is got from examination of the bile than from the faeces, and that the method may be of value when the blood culture is negative and agglutination is complicated by previous vaccination. [No indication is given in this paper of the number of cases examined in these ways].

J. H. S.

**ROUSSEL.** *Bacilles paratyphiques atypiques Isolés par Hémoculture.*—*C. R. Soc. Biol.* 1914. May 8. Vol. 76. No. 15. pp. 721-723.

In 303 positive blood-cultures made in Algeria in 2½ years Roussel 227 times obtained the typhoid bacillus and 76 times a paratyphoid bacillus. He tabulates the cultural characters of four of the latter as atypical organisms, but his table chiefly illustrates the necessity of some international standardisation of the tests to be applied to bacilli of the Coli-Typhoid group.

J. H. S.

**BLAKER (G. H.).** *Note on the Preparation and Standardisation of Typhoid Vaccine.*—*Indian Jl. Med. Research.* 1914. Apr. Vol. 1. No. 4. pp. 726-728.

Blaker finds that the growth of typhoid on mutton broth (beef broth being inappropriate for Hindus) is more vigorous when the broth is sterilised in a Koch's steriliser than when sterilised in an autoclave.

J. H. S.

**DREYER (Georges), WALKER (E. W. Ainley) & GIBSON (Alexander G.).** *Typhoid and Paratyphoid Infection. No. 2.—The Detection and Identification of *B. typhosus* and *B. paratyphosus*.*—*Lancet.* 1915. Mar. 27. pp. 643-647. With, 2 figs.

As the result of a series of tests of the three differential media in common use for the isolation of typhoid and paratyphoid bacilli, the writers conclude that Endo's, MacConkey's, and the Drigalski-Conradi media all to some degree inhibit the growth of these bacilli, and this to a greater extent than *B. coli*. Drigalski-Conradi was least efficient, MacConkey only slightly better, and Endo distinctly the best. Typhoid was not recovered from the first two when there were more Coli present

than 10 for each typhoid bacillus, nor from Endo when the proportion was more than 15 to 1; but when unmixed cultures were plated, many more typhoid grew on Endo than on the others. It is necessary, however, to use the Endo medium at the correct point of dryness. A too dry plate gave very unsatisfactory results. [Tests of this character usually give discordant results in the hands of different workers. The result depends largely on small points of preparation or handling, such as this of drying, and different workers seem usually to get the best results with the medium to which they are most accustomed.]

The authors have been successful in isolating both typhoid and paratyphoid from faeces, where the ordinary methods failed, by the use of an arc light. An ordinary agar plate is sown with a relatively large quantity of faecal emulsion, and by a simple arrangement portions of the plate are exposed for times varying from 30–240 seconds to the rays of an arc light so constructed as to give a cold illumination. From mixtures containing 50 Coli to 1 Typhoid the latter organism has always been readily isolated, and even with a proportion of 200 to 1 they have been usually successful. Their practical experience with the method has as yet been small, but further results will be awaited with interest.

J. H. S.

**LEISHMAN (William). Anti-typhoid Inoculation.—*Jl. R. Army Med. Corps*. 1914. Apr. Vol. 22. No. 4. pp. 365–377.**

The British records contain evidence in regard to the use of anti-typhoid vaccination unequalled in the publications of any other country for completeness, accuracy, duration or satisfactory control, and it is of interest to read in this, a paper read to the International Medical Congress, Sir W. Leishman's opinions on the method he had so large a share in elaborating. Some of the points he discusses we need not refer to here, but it is worth noting that he finds no reason to think a highly virulent strain gives better immunity than the low-virulence strain hitherto used, and that the uniform ratio in the incidence on inoculated and uninoculated of typhoid contracted in countries so diverse as Egypt, India, South Africa and West Indies, gives no support to the suggestion that a polyvalent vaccine would be more efficient. He believes that a successful vaccine must produce some degree of reaction, both local and general, although he is inclined to think that individuals who show excessive reactions on inoculation are unlikely to develop a satisfactory immunity to subsequent infection. It is satisfactory to find him making light of the supposed "negative phase" risk. Reprinted from the Report of the Anti-Typhoid Committee is a table giving the effect of inoculation in the 24 "Test Units" in India, and (along with a table showing the incidence of typhoid in the Indian troops since 1890) is an additional table giving the inoculation figures for 1911 and 1912 in India. Per 1,000 strength of the troops there were amongst the inoculated in 1911 1·7 cases with 10·37 per cent. mortality, and in 1912 1·2 cases with 12·8 per cent., whilst amongst the uninoculated there were in 1911 5·9 cases with 17·18 per cent. deaths, and in 1912 5·6 cases with 40 per cent. deaths. Statistical evidence, confirming the experimental, is given to show

that antityphoid vaccination confers no immunity against paratyphoid infection. This produced 168 cases in the two years 1911 and 1912; of these only 4 died and all but 5 were due to the *B. paratyphosus* A.

J. H. S.

DREYER (Georges), WALKER (E. W. Ainley) & GIBSON (Alexander G.).—**Typhoid and Paratyphoid Infection in Relation to Antityphoid Inoculation, together with Remarks on the Importance of the Use of Prophylactic Paratyphoid Inoculation.**—*Lancet*. 1915. Feb. 13. pp. 324–328. With 1 chart.

The serious importance of paratyphoid infections is well shown in this paper. At the base hospital in Oxford to date only eight cases of typhoid fever were met with, and as many as six cases of paratyphoid infection with the *B. paratyphosus* B, of which two were apparently infected also with the *paratyphosus* A. Of these six three were in patients recently inoculated against typhoid, and they illustrate (1) the now established fact that such inoculation confers no protection against paratyphoid infection; (2) the manner in which inoculation statistics are vitiated when full examination is not carried out in every case; (3) the desirability of prophylactic inoculation with all three organisms, a point on which the authors insist, recommending the use of mixed vaccines. They point out that inoculated individuals may show a high agglutination titre, and state that the most practical way of determining whether such patients are suffering from active typhoid fever is repeated investigation of the maximum titre of the serum with standard suspensions of typhoid and the two paratyphoid bacilli. Agglutination due to inoculation remains at a constant level but in active fever the titre rises or falls according to the stage of the disease. The highest titre is obtained with the bacillus producing the fever; should agglutination occur with more than one of the three organisms, the repeated examination will show the agglutination curve of the second organism running parallel to that of the first, if it is an instance of co-agglutinin production, but not parallel, even perhaps crossing, if there is a mixed infection. [Some of these statements require a good deal of confirmatory evidence, which is at present held over.] Their method of preparing the standard stock suspensions necessary to make comparable the repeated observations on different days is described, macroscopic examination being used.

J. H. S.

CASTELLANI (Aldo). **Note on Typhoid-Paratyphoid Vaccination with Mixed Vaccines.**—*Centralb. f. Bakt.* 1. Abt. Orig. 1914. Vol. 72. No. 6/7. pp. 536–543.

Castellani has at different times insisted on the advantage of using mixed typhoid and paratyphoid vaccines in countries where both infections are common, and he here gives again briefly some of the data in his hands, which go to show that such vaccines are not only harmless but establish immunity to all the three organisms. He has made several thousand such inoculations both with dead and with attenuated live vaccines with results no more serious than attend

ordinary typhoid vaccination. The immunity attained, as gauged by the production of agglutinins alone, was estimated in a small series of individuals and reached much the same height for each of the organisms as was obtained by separate inoculations of each organism in the same dose. He states that "when the immunisation is obtained by a single inoculation, provided the minimum dose sufficient to obtain the maximum immunisation be given, the amount of agglutinins, etc. elaborated by the inoculated animals is not in proportion to the amount of culture injected"—a remark to which it is difficult to attach any precise significance. He recommends for routine use a vaccine killed at 53° C., containing 500 million typhoid and 250 million of each paratyphoid in 1 cc., and a first dose of 0.6 cc., and a second of 1.2 cc.

J. H. S.

**WADE (E. M.) & McDANIEL (O.). Observations on the Widal Reaction following the Administration of Typhoid Vaccine.**—*Amer. Jl. Pub. Health.* 1915. Feb. Vol. 5. No. 2. pp. 136-146.

In a Hospital for the Insane 1,179 persons were vaccinated, each receiving three injections at 7-10 day intervals, and the serum of these individuals was tested for Widal reaction before injection, 7-10 days after each injection and at intervals afterwards up to a month or more after the last injection. All were negative before injection, and 92.8 per cent eventually gave a positive Widal, 3.7 per cent. a partial reaction, and 3.5 per cent. a persistent negative. At the time of the third dose 75.1 per cent. were already positive, and 89.3 per cent. positive ten days later. Of the 44 which never showed more than a partial reaction 19 very quickly (14 days after third injection) lost all trace of agglutinins. Out of the 1,179 persons 805 were examined again six months or one year later, 35 of these being patients who had given partial or no reaction after completion of immunisation. Of these 35 none gave agglutination at the later examinations. In the remaining 770, 68.2 per cent. were negative at the later examination, 8.8 per cent. partial and only 23 per cent. positive. After one year only 11.7 per cent. of 177 persons examined were still positive.

In a second Institution a similar examination was carried out, though less thoroughly. Of 1,396 cases vaccinated 37 per cent. gave a positive reaction 10-30 days after the third dose, 19 per cent. were atypical, i.e. partial, and 44 per cent. gave a negative reaction—a surprisingly high percentage of failures, for which the writers could find no explanation.

J. H. S.

**DYER (A. W.) The Agglutination Reaction after Anti-Typhoid Inoculation.**—*Indian Jl. Med. Research.* 1914. Apr. Vol. 1. No. 4. pp. 729-734. With 3 charts.

Dyer examined at Kasauli 182 non-commissioned officers and men who had previously been inoculated with typhoid vaccine. Of these 42 had been inoculated within 12 months, and of them six were positive in serum-dilutions of at least 1:160, 15 in 1:80, and all but 4, i.e. 90.5 per cent., in upwards of 1:16. Sixty-three had been inoculated

between 12 and 24 months, of whom 1 reacted in 1:160, 1 in 1:40, and 22.2 per cent. in higher dilutions than 1:16. Seventy-three had been inoculated more than 24 months previously, and of these only 4, or 5.2 per cent reacted in higher dilutions than 1:16, and none higher than 1:20. Dyer concludes that in a patient inoculated over six months previously a reaction of 1:40, i.e.  $2\frac{1}{2}$  times above the normal limits, indicates that the patient probably has typhoid fever. The test strain of typhoid used in these experiments was that employed at the Kasauli Pasteur Institute for routine Widal examinations, and against the serum of 500 healthy individuals was shown in 1911 "never to agglutinate with normal serum in a dilution above 1:16."

J. H. S.

**TROWBRIDGE (E. H.), FINKLE (B. A.) & BARNARD (Elizabeth M.).—**  
**Report of Typhoid Epidemic occurring three Months after the Use of**  
**Prophylactic Vaccine.**—*Jl. Amer. Med. Assoc.* 1915. Feb. 27.  
Vol. 64. No. 9. pp. 728-731.

In the Minnesota School for Feeble-Minded and Colony for Epileptics at Faribault an outbreak of typhoid occurred in the early spring of 1914 and, investigations having revealed the presence of eight carriers, 1,520 patients were inoculated prophylactically. Three months after the inoculations were completed, the milk supply to the Institution was contaminated with typhoid, and a second outbreak occurred amongst the inmates. There were in all 57 cases, of whom 44 were in inoculated and 13 in uninoculated individuals. No information is given as to the number of uninoculated persons exposed to infection, but if all the 1,520 were so exposed, the incidence in the inoculated was 2.9 per cent. The mortality in the inoculated was 9.1 per cent., in the unvaccinated 23 per cent. and, although the course of the disease was not apparently shortened in the vaccinated, they failed to give many of the classical symptoms. Three prophylactic injections were given of the State Board of Health vaccine, but it is noteworthy that out of 1,390 persons examined 46.6 per cent. after completed vaccination gave a negative Widal, and in 127 persons 52.7 per cent. gave a positive Widal after the second dose and only 29.1 per cent. after the third dose—a remarkable occurrence if the examinations were made at the proper intervals after injection. [This outbreak illustrates clearly the recognised fact that antityphoid vaccination does not confer complete protection, but reduces the mortality and the incidence. It is a pity more details are not given, e.g. from three cases *B. paratyphosus* was isolated, and it is not clear how many were fully examined bacteriologically, though only two out of 46 patients examined agglutinated *B. paratyphosus*.]

J. H. S.

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## CHOLERA.

SIMPSON (W. J.). *The War and Cholera.*—*Trans. Soc. Trop. Med. & Hyg.* 1915. Mar. Vol. 8. No. 5. pp. 139–158.

*War and Cholera.* [Abstract of Paper read at the Society of Tropical Medicine & Hygiene.]—*Lancet.* 1915. Apr. 10. pp. 741–747.

An interesting consideration of the likelihood of the addition of epidemic disease, in particular cholera, to the disasters of war, flood and famine, best read in its entirety.

After considering the disease historically the author turns to its connection with war. Only three European wars, the Russo-Polish in 1831, the Crimean, and the Balkan, have been associated with cholera. As there were epidemics during 1914 in Russia, Hungary, Austria, Germany and Turkey, there is reason to fear its spreading in the fighting lines this August. Protective measures should at once be undertaken. The degree of protection afforded by Haffkine's inoculation is shown by the fact that with inoculated and uninoculated living side by side in the same huts the giving of a living vaccine lowered the mortality in one epidemic from 10·86 per cent. to 2·99 per cent. Using a stronger vaccine, with very large numbers under observation (over 13,000) the incidence in the uninoculated was 3·02 per cent. with mortality 1·89 per cent., while amongst the inoculated it was 0·47 per cent. with a mortality of 0·24 per cent. This protection is not to be relied upon for more than 14 months. Killed cultures have been very largely and effectively used in Japan, Ceylon and Greece (on half a million persons in Greece during the Balkan war). The author recommends CASTELLANI's method of giving mixed cholera, typhoid and paratyphoid A and B vaccine as a means of saving time and trouble.

In the discussion that followed Sir Ronald Ross suggested as one reason for the present lack of greater popularity in India of HAFFKINE's anti-cholera vaccination, that HANKIN's method was more suitable for treating the natives there. In answer to questions by the President, Sir Havelock CHARLES, Simpson pointed out that while experiments on animals indicated that subsequent to cholera inoculation there was a period of lowered resistance to the disease the careful observations on man in India showed no trace of this. That in Bulgaria during the 1913 war a fall in immunity appeared to follow inoculation, might be the result of insufficient supervision and verification of facts, occasioned by the exigencies of the time, the apparent lowering of immunity being in reality due to an inoculation taking place during the period of incubation.

H. Schütze.

HEISER (Victor G.). *Cholera in the Philippines during 1913.*—*Med. Rec.* 1914. Nov. 14. Vol. 86. No. 20. (Whole No. 2297). pp. 827–829.

In August 1913 cholera cases occurred in Manila. From the continued examination of the stools of all steerage immigrants and of those



coming from cholera parts it did not seem that the disease had been imported from abroad; and for almost two years there had been no cholera anywhere in the Philippines. Arguing from these data, together with the fact that cases at the beginning of an outbreak often occur simultaneously and without discoverable connection, the author suggests that the cholera vibrio may pass through a cycle and in some of its stages escape detection by present laboratory methods, at some subsequent period entering the stage which gives rise to the disease and by passage through a number of persons increasing in virulence. Eighty per cent. of the cases occurred in houses without modern sanitary arrangements. Of 876 contacts examined in connection with 72 cases, 40 showed the presence of vibrios of some sort, and 29 of Koch's vibrio. Prompt measures taken by the authorities quickly suppressed the various local outbreaks, the prophylactic measures being—isolation of sick and carriers, disinfection of excreta, safeguarding of food and water supply; treatment in the main consisted of intravenous transfusion of saline.

H. S.

**BRAHMACHARI (B. B.). A Short Note on Cholera as an Endemic in Cossipur-Chitpur, Bengal.**—*Proc. Third All-India Sanitary Conference held at Lucknow Jan. 19-27, 1914.* Vol. 4. Papers Suppl. to *Indian Jl. Med. Research.* pp. 102-113.

A consideration of the mortality rate and the chief factors of importance in the endemic at Cossipur-Chitpur, such as fairs, immigrants, meteorological conditions, etc., with an account of the difficulties met with in combating it. A translation of a pamphlet circulated among the inhabitants is appended.

H. S.

- i. NEUMANN (Hugo). **Ueber Cholera asiatica.** [On Asiatic Cholera].—*Wien. Med. Woch.* 1915. Jan. 2. Vol. 65. No. 1. pp. 26-31.
- ii. GAERTNER (G.). **Bemerkungen zur Pathologie und Therapie der Cholera asiatica.** [Observations on the Pathology and Therapy of Asiatic Cholera.]—*Ibid.* Jan. 23. No. 4. pp. 182-186.

i. In October and November 1914 in Krems on the Danube 400 cases of cholera, mostly of a light nature, occurred in one infantry regiment, the cause being vibrio infected drinking water. The author was concerned with 129 of the more severe cases. He divided them into two groups, (1) with cholera diarrhoea, (2) algid or comatose cases. In the first group were 95 cases and only three were bacteriologically positive; of these three, one presented no features different from the negative cases, one had a high pulse rate and one became subsequently comatose and died. This last case was examined two or three times by Professors KRETZ and HELLY but the Koch bacillus was never isolated. Of the 36 very severe cases most of the fatal ones gave positive bacteriological results, but the prognosis was not greatly helped by the laboratory finding as there were several "positives" who recovered and one "negative" who succumbed. The following table gives at a glance the result of bacteriological investigation in the 36 severe cases.

Number of severe cases.	The bacteriological finding was		
	positive	negative	uncertain
36	18	15	3
Of these were fatal			
12	8	1	3

The author considers attentive and careful nursing the great desideratum in cholera, and that the lowered blood pressure is the chief sign to be followed both for prognosis and therapy. Most cases were extremely apathetic; two showed marked restlessness. In three cases a rash was seen; one began as raised, milletseed spots, at first pink, then dark red, on the extensor surface of the extremities, subsequently spreading rapidly over the whole trunk and face, resembling on the second day measles; afterwards it became confluent and resembled urticaria. Another commenced on the abdomen; the face was involved, an erysipelatous condition resulting. The hyperaemic patch disappears on pressure and shows in the centre a small pin-point-sized transparent blister. No prognostic importance could be attached to the rash; in one case it preceded rapid recovery, in another equally rapid death. The author places most reliance on a therapy in which warmth and restoratives play a big part. A mustard bath (40°–42° C.) for not longer than eight minutes, with subsequent vigorous rubbing down, the application of warm sand bags all over the body, and the administration of hot red wine or black coffee, he considers most effective. The reaction of the skin to this bath he regards of prognostic value. The injection of 1·5 per cent. saline subcutaneously or physiological saline intravenously does not give such good results. Camphor is given as soon as the pulse shows signs of failing. For internal medication:—bolus alba and opium with iodine tincture to counteract the tendency to vomit; calomel and castor oil if meteorismus is present. The author did not find the disease clinically contagious and considers that, if the stools are disinfected, there is no need for strict isolation.

ii. Discussing this communication, Gaertner pointed out that the epidemic, with which NEUMANN had had to deal, did not seem to be a severe one and probably for the reason that his hospital only received patients who had outlived the first days of illness, those days which show the highest mortality returns. Another point in favour of the observation that the more severe cases did not reach the hospital, is that NEUMANN apparently did not have patients with anuria. The author found during the Hamburg epidemic that cases without anuria had a mortality of 0 to 4 per cent., while those with anuria had one of 55 to 60 per cent. That PRAŠEK during the first siege of Przemyśl saw a cholera mortality of 50–60 per cent. in cases untreated or at most only given iodine tincture, was evidence that virulent cholera organisms were present. With regard to treatment

the author thought hot baths might assist the circulatory system, but pointed out that WINTERNITZ achieved similar results in earlier epidemics with cold baths and cold massagings. The author spoke strongly in favour of intravenous hypertonic saline injections (which he claimed to have advocated 16 years before ROGERS). PRAŠEK, whose mortality of 50–60 per cent. for untreated cases at Przemysl has been quoted above, lowered the death rate to 18–20 per cent. by giving a 5 per cent. saline injection subcutaneously, while a fellow worker using by mistake a 1 per cent. solution did not get a lowered mortality. WIENER gave a 2 per cent. solution intravenously and observed congestive head symptoms. The author thinks it remains to be decided which is the optimum strength of saline solution to be used, but considers that 0.6 g. Na Cl to 1 kg. body weight might be about right; thus one would give 2,000 gm. of a 2 per cent. solution or 800 gm. of a 5 per cent. solution to a person weighing 70 kg. He also considers the addition of glucose to the saline advisable, for the purpose of dilating the renal blood vessels and stimulating diuresis. A 9 per cent. glucose solution has been given intravenously and well stood.

H. S.

**STERNBERG (Carl). Zur Epidemiologie und Bekämpfung der Cholera.**

[The Epidemiology of and the Campaign against Cholera.]

—*Wien. Klin. Woch.* 1915. Apr. 8. Vol. 28. No. 14. pp. 361–367.

Observations on some 275 cases of suspected cholera. Nothing of great interest. One hundred and eight cases were diagnosed bacteriologically as cholera and showed a mortality of 42.6 per cent., none of the patients having had prophylactic cholera inoculations. The vibrios disappeared from the stools sometimes as early as the sixth or seventh day, but generally not until the eleventh or fourteenth. On two occasions the *V. cholerae* was isolated from corpses buried eleven and fourteen days respectively. Great irregularity marked the finding of carriers among contacts. No hospital nurses or attendants developed into carriers or acquired the disease, which was in marked contrast to the occurrence of various small local epidemics around cases treated in private. In support of the possibility of carriers subsequently developing the disease, the author instances the case of a contact who developed cholera eleven days after isolation.

H. S.

**BRADDOCK (C. S.), Jr. Some Notes on Asiatic Cholera; Its Prevention and Treatment.**—*Internat. Clin.* 1914. Ser. 24. Vol. 4. pp. 68–75.

For the most part a resumé of known facts concerning cholera. The author does not believe in the efficacy of saline transfusions, but pins his faith to “keeping the blood where it belongs,” viz. in the blood vessels. His treatment is (1) to prevent vomiting so as to retain the remedial drugs, by giving cocaine, creosote and cerium oxalate; (2) to administer stimulants and diuretics, such as digitalis, nitroglycerine and tincture of eucalyptus in extremely large doses, which he finds

are alone of use in cholera patients ; (3) to prevent the escape of serum from the blood vessels by means of large quantities of some modified tannic acid preparation, such as protan. Great stress is laid on the complete withholding of food for 36 hours or longer. No numerical results are given.

H. S.

**SALUS (G.). Kurze Mittellung über Untersuchungsergebnisse bei Cholera und bei bazillären Ruhr.** [A Note on the Diagnosis of Cholera and Bacillary Dysentery.]—*Prager Med. Woch.* 1915. Jan. 14. Vol. 40. No. 2. p. 15.

As showing the importance of examining the stools of all people coming from a cholera infected region, the author quotes seven cases of soldiers arriving within a few weeks of one another from the Russian war zone without any clinical suspicion of cholera attached to them and yet whose stools readily yielded cultures of the comma bacillus. In two the blood was examined for agglutinins but none was found. In one case with symptoms of a typhoid nature the Widal test was positive at 1 : 100 and from the stools both *B. typhosus* and *V. cholerae* were isolated. The author found the Peptonwater method excellent, although the formation of a skin on the surface was not constant ; the first culture could always be used for agglutination purposes and usually for macroscopic agglutination.

H. S.

**ARZT (Leopold). Ueber Cholera und Cholera-Vakzination.** [Cholera and Cholera-Inoculation.]—*Wien. Klin. Woch.* 1914. Nov. 19. Vol. 27. No. 47. pp. 1502-1505.

Observations on 25 cholera cases seen in Cracow during three weeks of October, 1914. Bronchopneumonia was often a late complication, giving a fatal termination to convalescent cases or considerably prolonging that convalescence. Three cholera cases were accompanied by a rash in the form of lentil-sized maculae which subsequently became confluent and often had small central fleabite-like haemorrhages. The accompanying joint pains and the transient nature of the rash pointed to a toxic origin. Two cases which had received anti-cholera inoculations, the one two days before the beginning of the attack and the other actually during its first stages, ran mild courses and did not suggest the existence of any negative phase.

H. S.

**de VOGEL (W. Th.). Sur un Mode de Propagation du Choléra par Mer.** —*Far East. Assoc. Trop. Med. C. R. Trois. Congrès Biennal. Saigon (1913).* 1914. pp. 259-263. With 1 plate.

A warning of the danger attendant on the building of ships with nightsoil scuppers discharging above the water-line, so that where loading and unloading are carried out by means of lighters, the crews of these boats coming directly in contact with the soiled sides of the vessel run great risk of being infected, if there are cholera carriers on board.

H. S.

**POTTEVIN (H.).** Instructions pour le Prélèvement, l'Envoi et l'Examen des Fèces en Vue de la Recherche du Vibrion cholérique.—*Bull. Soc. Path. Exot.* 1915. Mar. Vol. 8. No. 3. pp. 98-103.

Simple and concise rules for the taking, dispatching and examining of suspected cholera stools, needing to be read in their entirety. The author draws the following conclusions from his examinations :—(1) If two stools, taken with an interval of 24 hours, both give negative results the person may be regarded as not infected with cholera. (2) If a vibrio agglutinating with cholera serum be isolated the person, no matter what his state of health, *must be regarded as dangerous and isolated like a cholera patient.* (3) If a morphologically and culturally typical vibrio, inagglutinable with cholera serum, be isolated from a stool, the person, in view of the rarity of the presence of vibrios of any kind in the human intestine and the known occurrence of cholera strains that are inagglutinable when recently recovered, had better be isolated like a proved carrier. The examination of carriers should be repeated every 24 hours; isolation may cease after two negative results have been obtained.

H. S.

**CROWELL (B. C.).** Notes on the Diagnosis of Asiatic Cholera at Autopsy.—*Philippine Jl. of Sci.* Sect. B. Trop. Med. 1914. Aug. Vol. 9. No. 4. pp. 361-365.

Pathological experience in the autopsies of 92 cases. In his summary the author remarks "that while probably no one anatomical feature is constant, the following features are the ones on which a diagnosis is chiefly based :—Acute catarrhal enteritis associated with (1) cyanotic finger nails, (2) dry tissues, (3) oligæmia, (4) dry and sticky peritoneum with pink serosa of ileum, (5) contracted and empty urinary bladder, (6) shrunken, dry spleen and liver, (7) acute degeneration of parenchymatous organs, (8) poorly coagulated blood, (9) absence of formed faeces, (10) presence of rice-water intestinal content and (11) prominence of lymphoid tissue in the ileum."

With regard to bacteriological confirmation of post-mortem diagnoses in 87 cases there was agreement between the two; five cases were anatomically negative, but bacteriologically positive, these being cases in which some other disease, such as acute peritonitis from a strangulated hernia or generalised tuberculosis, gave a dominating impression.

H. S.

**DEDEKIND (Franz).** Choleraimpfphegmonen. [Cellulitis after Cholera Inoculation.]—*Med. Klin.* 1915. Feb. 7. Vol. 11. No. 6. pp. 158-159.

An account of 18 cases of cellulitis at the site of inoculation, occurring in a reg ment which was inoculated against cholera apparently without any preparation of the skin or any sterilisation of the hypodermic syringe between man and man. All cleared up rapidly on incising and draining. A similar outbreak to this one, which took place in Leipnik (Moravia), occurred in Bohemia.

H. S.

**MILNE (Charles).** **An Interesting Sequela in a Case of Cholera.—**  
*Indian Med. Gaz.* 1915. Feb. Vol. 50. No. 2. pp. 58–60.

An account of an intestinal hæmorrhage accompanied by acute pain in the epigastrium developing in a cholera convalescent, which the author considered due to an erosion in the duodenum, caused either by one of the permanganate pills administered, settling there and cauterising the bowel wall or by toxic absorption from the colon with vago-tonic influence, it having been suggested by WILKIE that a definite relationship exists between duodenal ulcers and morbid conditions of the lower bowel.

H. S.

**OBREGIA & PITULESCO.** **Études sur les Psychoses du Choléra.—**  
*Encephale.* 1914. pp. 393–402.

From their observations on some 2,000 cases of cholera in the Roumano-Bulgarian war of 1913 the authors distinguish the following mental forms:—(1) Depressive: the signs of sadness, discouragement, even anguish occur before other clinical signs are even apparent; complaints of thirst and great unrest; the sensations of anguish are referred to the præcordial region of the chest; a dread of the disease does not play a big part in the “anguish,” which is caused by the state of dehydration of the blood and the anuria. (2) Asthenic: a condition of absolute immobility and stupor, often accompanied by an optimism that considers the symptoms merely those of fatigue. (3) Delirious: associated with mental confusion, loss of memory.

H. S.

**RENAULT.** **Notes on the Treatment of Cholera by the Exhibition of Chlorhydrate of Emetine in Hypodermic Injections.—***Indian Med. Gaz.* 1914. July. Vol. 49. No. 7. pp. 270–271.

During a violent epidemic with high death-rate [actual figures not given] in Pondicherry, the author used emetine chlorhydrate, 1 in 100, hypodermically, the doses being graduated from 4 centigrammes per day for patients over 25 years of age to 1 centigramme per day for patients between 1 and 8. Forty-four recovered out of 60 cases treated; roughly 73 per cent. of cures. He considers the treatment specially useful owing to its simplicity and the fact that it is little likely to be objected to by natives.

H. S.

**ROGERS (Leonard).** **Emetine in Cholera.—***Indian Med. Gaz.* 1915. Jan. Vol. 50. No. 1. pp. 4–5.

Half a grain of emetine hydrochloride was injected hypodermically morning and evening in addition to the routine use of intravenous hypertonic saline injections and the giving of permanganates. As the cholera mortality varies from month to month and in different periods of an epidemic, alternate cases only received emetine, the others remaining as controls. After 32 had received the treatment it was stopped as no benefit appeared to follow. The following table gives the results and shows at the same time how nearly equally the four factors which so greatly influence the prognosis of a case, occur in the two groups.

TABLE I.

## The Principal Factors Influencing the Mortality of Cholera.

	Emetine Cases.	No Emetine.
Cases with no pulse on admission ..	10	15
Cases with Sp. Gr. over 1,065.. ..	8	3
Cases requiring two or more intra-venous saline injections.. ..	10	10
Patients over the age of 50 years ..	1	1
Deaths among 32 cases .. ..	4	4

The low mortality figures obtained by RENAULT [see above] with emetine do not prove the efficacy of the drug, as control cases were not observed and apparently severe cases did not receive the treatment.

H. S.

**PRÁSEK (E.). Subkutane Infusionen fünfprozentiger Kochsalzlösung als Therapie der Cholera asiatica.** [Subcutaneous 5 per cent Saline Injections in the Treatment of Cholera.]—*München. Med. Woch.* 1914. Dec. Vol. 61. pp. 2390-2391.

Not all cases, during this outbreak in Przemyśl, received saline injections, but every case received tincture of iodine, three drops in water 4-5 times a day, which though very efficacious in stopping vomiting did not, when given alone, seem to lower the mortality, which remained about 50 per cent. Forty cases, many severe and apparently hopeless, received the following treatment:—Half a litre of 5 per cent. sterile salt solution at 37° C. was given subcutaneously in the abdominal region. This was repeated after six hours and sometimes a third injection was given on the following day. "Caffein sod. benzoic." was given several times subcutaneously in doses of 0.2 gram. With a better pulse the patient received a hot bath and massage of the limbs. Generally an improvement in all symptoms was noticeable after the first injection and recovery rapidly set in. The mortality was 18-20 per cent. This good result was apparently due to the hypertonicity of the salt solution; a number of cases received by mistake a 1 per cent. salt solution and were not beneficially influenced by the treatment. Early treatment is very desirable. In every case cholera had been diagnosed bacteriologically.

H. S.

**CADBURY (William W.) & HOFMANN (J. Allen). The Treatment of Cholera by Transfusion of Saline Solution.**—*Jl. Amer. Med. Assoc.* 1914. Oct. 3 Vol. 63. No. 14. pp. 1200-1202.

In the summer of 1913 a severe epidemic of cholera broke out in Canton after ten years quiescence. An account is given of the treatment of cases in a hospital for the insane, at first with subcutaneous saline injections and little result, later with intravenous transfusions. Although only very rough and ready means could be employed, the results were good and no evidence of septicaemia or trouble from entrance of air into the circulatory system occurred. Six to ten

litres were given or until the flow of water from mouth and rectum pointed to the saturation of the blood. Excepting for the administration of dilute sulphuric acid saline was the only treatment. Of 27 patients transfused 74 per cent. recovered; of 17 not transfused 35 per cent. recovered, some of these non-transfused cases being thought too mild to need it.

H. S.

**BRACHIO (J. J. A.). Treatment of Cholera by the Intraperitoneal Injection of Iodine.**—*Indian Med. Gaz.* 1914. Aug. Vol. 49. No. 8. pp. 309–311.

**Iodine in Cholera.** [Correspondence].—*Ibid.* Oct. No. 10. p. 411.

A short account of the treatment of cholera with iodine by the mouth.

Tinct. Iod.	..	..	..	..	..	℥ 10
Acid Sulph. Dil.	..	..	..	..	..	℥ 10
Tinct. Digitalis	..	..	..	..	..	℥ 10
Aqua	..	..	..	..	..	ad oz. 1

One ounce every four hours.

Forty recoveries out of 54 cases treated; roughly 74 per cent. of cures. And with iodine intraperitoneally.

Iodum	..	..	..	..	..	gr. $\frac{1}{4}$
Pot. Iod.	..	..	..	..	..	gr. $\frac{1}{4}$
Aqua dest.	..	..	..	..	..	℥ 20

Twenty minims injected intraperitoneally.

Thirty-three recoveries out of 42 cases treated; roughly 79 per cent. of cures. Adrenalin solution, dropped on tongue, was given frequently as a cardiac stimulant and diuretic. [No mention made of the general mortality of the epidemic.]

H. S.

**VON FRENDEL (E. R.). Ueber die Anwendung des Kallumpermanganats bei Cholera.** [The Use of Potassium Permanganate in Cholera.]—*Wien. Med. Woch.* 1914. Nov. 28. Vol. 64. No. 48. p. 2428.

An account of the treatment of 326 cases of cholera with, as sole internal medicament, potassium permanganate. The drug was given in dilute solution (0.1 : 1,000) as a beverage. The author claims that most striking results occur in every case; vomiting ceases after a few spoonfuls and the number of stools is greatly diminished after 24 hours. The good result remains permanent, unless the case is too severe.

H. S.

**GROÁK (F.). Behandlung der Cholera mit Thierkohle (Vorläufige Mitteilung).** [The Treatment of Cholera with Animal Charcoal. (Preliminary Note).]—*Wien. Klin. Woch.* 1915. Apr. 15. Vol. 28. No. 15. pp. 391–392.

A short note on the administration of animal charcoal in cholera; it was found that the 20 grams, which were given per day, should be



taken in water with brandy added and in small quantities every 10 minutes. Vomiting did not then ensue; 1-2½ litres of 1·5 per cent. [1·5 per thousand is mentioned, no doubt in error] saline were given subcutaneously per day. The mortality with this treatment was 12 per cent., the moribund and untreatable cases, however, not being included. No other statistics given. Animal charcoal was found of use in gastroenteritis of all sorts and in dysentery.

H. S.

GOFF (A. P.) & DENNEY (Oswald E.). **Clinical Observations on Asiatic Cholera in Manila in 1914.**—*Jl. Amer. Med. Assoc.* 1915. Apr. 3. Vol. 64. No. 14. pp. 1148-1151.

Continuous proctoclysis was found to be very beneficial, inducing evacuation in the "sicca" cases and encouraging kidney elimination, as seen by the fact that after this treatment was commenced a return of the renal secretions would be observed, while when it was interrupted a distinct decline in the urinary flow would take place.

H. S.

GREIG (E. D. W.). **Lesions of the Gall-Bladder and Biliary Passages in Cholera: A Bacteriological, Histological and Experimental Study.**—*Indian Jl. Med. Research.* 1914. July. Vol. 2. No. 1. pp. 28-45. With 14 coloured plates.

For the purpose of discovering to what extent the gall-bladder and biliary passages are involved and show changes in cases of cholera, the author studied the post-mortem records of the Medical College, Calcutta, for the years 1894-1912, investigated a number of cases bacteriologically himself and carried out experiments on rabbits.

In 4 per cent. of the 235 cases in the post-mortem records some naked-eye signs of inflammation of the gall-bladder were seen. In his own series of 271 post-mortem examinations, signs of inflammation were found in 4·4 per cent. and the author thinks this figure should give "some idea of the number of cases of cholera which may become permanent carriers." In these visibly altered gall-bladders microscopic examination showed extensive structural alterations and many cholera vibrios situated in the depths of the bladder wall.

Microscopic changes in the wall of the gall-bladder: the partial or complete disappearance of the epithelial layer, the submucosa being in some cases thrown out in a series of ragged folds; inflammatory infiltration of the submucosa; foci of round cells in the middle and serous layers. The cholera vibrio was demonstrated histologically in the deeper parts of the submucosa, as the *B. typhosus* was by BINDSEIL in chronic typhoid carriers, and isolated in pure culture from the same site, the organisms lying superficially being destroyed by plunging the portion of bladder wall in alcohol and flaming. Similar microscopic changes were traced in the cystic duct, the hepatic duct and the common bile duct, vibrios being present in the wall throughout.

Round the biliary passages in the liver as well as between the liver cell columns, a round cell infiltration similar to that in the gall-bladder was seen. These changes of an inflammatory nature in the liver,

together with the presence of cholera vibrios in the liver substance itself, are regarded by the author of practical importance in considering the treatment of carriers. Were the focus of infection in such cases to be confined to the gall-bladder, it might be feasible to drain, scrape, or even remove it altogether.

Using rabbits and giving intravenous inoculations of the vibrio, the author was able to produce lesions in the gall bladder wall and the biliary passages of the liver similar in character to those found in acute cases of the disease occurring in human beings. It was also possible to recover the comma bacillus from the bile. In the inoculated rabbits marked changes in the mucous membrane of the duodenum and the presence of vibrios in the intestinal canal, pointed to an invasion of the gut via the intestinal wall. Certain cholera-like vibrios injected intravenously could, like the Koch bacillus, invade the tissues generally and be found subsequently in the various organs of the rabbit.

H. S.

**GREIG (E. D. W.). The Invasion of the Tissues by the Cholera Vibrio and Further Observations on Pneumonia in Cases of Cholera.—***Indian Jl. Med. Research.* 1914. July. Vol. 2. No. 1. pp. 1-27. With 3 coloured plates.

An examination of nine cases for the presence of Koch's vibrios in the various organs shortly after death, with clinical and post-mortem notes. The author found the vibrios in every case to be widely disseminated throughout the body and from the histological evidence concluded that the lymphatic system is mainly the channel of distribution, which, he thinks, may explain why in spite of a considerable number of attempts in no case had he been able to isolate the organism from the blood during life.

H. S.

**GREIG (E. D. W.). On the Simultaneous Occurrence of Cholera and Cholera-like Vibrios in the Tissues of Cases of Cholera.—***Indian Jl. Med. Research.* 1914. Oct. Vol. 2. No. 2. pp. 604-622.

An examination of the characteristics of certain cholera-like vibrios isolated in three cases of cholera along with the Koch bacillus. It was found that the cholera-like vibrios, while being morphologically and culturally like the true comma bacillus, were to be distinguished in that they (a) did not agglutinate with high titre cholera serum, (b) gave on inoculating into rabbits a serum which, while agglutinating the cholera-like vibrios, did not affect the true cholera vibrio, (c) did not salt out with high concentrations of magnesium sulphate. It was observed that broth cultures of the cholera-like vibrios in two out of the three cases haemolysed goat's blood, the Koch vibrio never doing so. The author warns against a bacteriological diagnosis of cholera without the fulfilling of these further tests.

H. S.

GREIG (E. D. W.). **The Haemolytic Action of Indian Strains of Cholera and Cholera-like Vibrios.**—*Indian Jl. Med. Research.* 1914. Oct. Vol. 2. No. 2. pp. 623-647. With 1 coloured plate.

No haemolytic action was observable in 333 cholera strains when the method employed was that of adding a three days old alkaline broth culture in varying quantities to a 5 per cent. suspension of goat's washed red corpuscles, letting the samples stand first for two hours at 37° C. and then over night in the ice chest; in 161 cases blood agar plates were used and examined not later than 24 hours (subsequent to that period clear zones may occur round the colonies, due to haemo-digestion) and the great majority showed no clear zones, a few only a slight indication.

The 100 cholera-like vibrio strains which were examined were morphologically and culturally similar to the true vibrio, those isolated from stools all being monociliated, a few from water having more than one flagellum, but they differed in that they did not agglutinate with high titre cholera serum and could not produce agglutinins for true cholera vibrios. All the 100 strains caused haemolysis, some to a marked extent. It was observed that after passing a broth culture through a Pasteur-Chamberland filter its haemolytic strength was greatly reduced. Anti-haemolytic sera were prepared from two cholera-like strains and each was found to inhibit haemolysis for the homologous strain but to give only partial inhibition in the case of the heterologous strain.

H. S.

GREIG (E. D. W.). **The Agglutinins in the Blood of Cholera Cases.**—*Indian Jl. Med. Research.* 1915. Jan. Vol. 2. No. 3. pp. 733-762. With 4 charts.

An examination of the agglutination titre in 363 cases of cholera. As control the author found, like PFEIFFER and KOLLE, that normal blood may only agglutinate cholera up to 1 : 20. A marked difference between fatal and non-fatal cases was observed. From the majority of the fatal cases (64 examined) no agglutinating serum was obtained, although some lived as long as 4, 5, 6, and 7, even 12 days; in a few cases 1 : 40 was reached. Of 210 non-fatal cases the majority showed well marked agglutination by the sixth day and agglutinins remained present until about the 20th when there was a drop. High titres, 1 : 400-1 : 1000, were frequently obtained. It was seen that during the early acute stage of the disease the agglutination test will not aid diagnosis; the clinical signs and bacteriological examination alone must be relied upon; but the finding of a high agglutination titre in a convalescent who comes to one with a suspicious history of illness, will materially help the diagnosis.

Carriers appear to retain a raised titre for some time and this fact should help in tracing such cases. An interesting point, indicating the non-pathogenic nature of cholera-like vibrios, was the observation that in 18 cases in which cholera-like vibrios, as well as true Koch

bacilli, had been isolated, and in 35 cases where no true cholera organisms but only cholera-like vibrios had been isolated, the blood serum contained only agglutinins for the comma bacillus and none for the cholera-like vibrios isolated from the patient's own stool.

H. S.

GREIG (E. D. W.). **On the Vitality of the Cholera Vibrio outside the Human Body.**—*Proc. Third All-India Sanitary Conference held at Lucknow Jan. 19-27, 1914.* Vol. 4. Papers. Suppl. to *Indian Jl. Med. Research.* pp. 81-101. With a chart.

Rice water stools kept in flasks at room temperature and protected from evaporation and the action of sunlight continued to show the presence of the cholera vibrio for a period which varied, according to the individual strain and the season of the year, from one day to seventeen, the temperature of Calcutta, where the experiments were carried out, ranging from the mean maximum, 102° F. in May to 48° F., the mean minimum in January. The table gives a summary of the results.

TABLE IV.

The following table shows the months in which examinations were made, the number of stools containing cholera vibrios examined, and the duration of life of the cholera vibrios:—

Months' examinations were made.	No. of stools containing cholera vibrios examined.	Duration in Days of Life of Cholera vibrios.		
		Minimum.	Maximum.	Average.
December 1912 ..	9	10	10	3·6
January 1913 ..	6	1	12	6·6
February „ ..	13	3	17	7·7
March „ ..	20	1	13	6·5
April „ ..	22	1	5	2·8
May „ ..	10	1	3	1·4
June „ ..	15	1	2	1·2
July „ ..	..	..	..	..
August „ ..	4	1	12	6·0
September „ ..	3	4	5	4·3
October „ ..	3	3	4	3·7

In a smaller number of cases the actual number of organisms present at various stages was determined.

H. S.

**SCHOEBL (Otto).** The Vitality of the Cholera Vibrio in Manila Waters.  
—*Philippine Jl. Sci.* Sect. B. Trop. Med. 1914. Nov. Vol. 9.  
No. 6. pp. 479-481.

The result of the experiment is clearly given by the table. In each case 10 cc. of water were infected with varying quantities of rice-water stool.

TABLE I.

The vitality of the cholera vibrio in Manila waters.

Sample of water.	Amount of faeces in loopful. Immediately.	Time in Days.																			
		1	2	3	4	5	7	9	11	13	19	27	35	43	56	66	76	86	96	106	122
H <sub>2</sub> O sterile Tempera- ture 25°- 27° C.	1	+	+																		
	3	+	+	+																	
	5	+	+	+	+	+	+														
	7	+	+	+																	
Tap water not steri- lized. Tem- perature, 25°-27° C.	1	+	+	+		+			+	+	+	+	+	+	+						
	3	+	+	+																	
	5	+	+	+	+																
	7	+	+	+	+		+														
Sea water, sterile. Tempera- ture, 25°- 27° C.	1	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
	3	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
	5	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
	7	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Specific gravity, 1,020.	9	+	+		+	+	+	+	+	+	+										

H. S.

**FLU (P. C.).** Over Hyp- en inagglutinabele choleravibrionen en hunne beteekenis voor de praktische diagnose der cholera. [Inagglutinable and Weakly Agglutinable Cholera Strains and their Importance for a Practical Diagnosis.]—*Geneesk. Tijdschr. v. Ned. Ind.* 1914. Vol. 54. No. 5. pp. 524-539.

After reviewing the literature on the subject the author describes his own experiments carried on during the 1913 Batavian epidemic. His strains were mostly isolated from well and river water, but also from the gall bladder of cholera corpses. Of the 62 vibrios isolated from water, five corresponded to the true Koch comma bacillus.

## AGGLUTINATION TABLE.

Serum used had titre 1:10000. *Vibrio* grown on ordinary agar.

Strain.	Date of Isolation.	Agglutination tested on	Titre reached.	Remarks.
I	30 Aug.	31 Aug.	1/1000	Isolated from 1 liter of river water.
		8 Oct.	1/3200	After 14 subculturings.
		25 Dec.	1/6000	Subcultured continuously every other day.
II	30 Aug.	1 Sept.	1/2000	Isolated from 1 liter of river water.
		8 Oct.	1/3000	After 14 subculturings.
		25 Dec.	1/7500	Subcultured continuously every other day.
III	24 Sept.	25 Sept.	Inagglutinable.	As liquid blood medium gave no haemolysis and on blood agar haemolysis occurred, vibrio was retested after 9 subculturings.
		30 Sept.	1/100	
		8 Oct.	1/2000	
		25 Dec.	1/4000	Subcultured every other day.
IV	6 Oct.	9 Oct.	1/3000	River, water.
		25 Dec.	1/10000	Subcultured every other day.
V	8 Oct.	10 Oct.	1/10000	Well water; an inhabitant succumbed to cholera after bathing in it.

Eight strains isolated from the gall bladder gave with a 1/6000 serum agglutination up to titre limit in four cases, up to 1/100–1/150 in three, and in one no agglutination at all. The three weakly agglutinating strains agglutinated fully after a couple of subcultures. Three tests are necessary for the complete identification of a cholera vibrio that is inagglutinable: (1) it must be typical morphologically and culturally, (2) it must recover its agglutinability on subculturing, (3) it must on inoculating into rabbits produce a serum which agglutinates the true cholera vibrio. The author was unable to induce variation in the agglutinability by inoculating into sterilised, or unsterilised, unfiltered Batavian river water. He found that cholera vibrios disappear from water in a few days and even after enormous numbers have been added no vibrios can be found six days later. The author cannot agree with HOROWITZ in thinking that the connecting links between epidemic and epidemic are inagglutinable vibrios, leading a saprophytic existence outside man (at any rate in the tropics), but concludes that they must be sought in the sporadic cases of cholera which occur. Like HOROWITZ he thinks that

inagglutinability probably arises during the sojourn of the organism in a human being and quotes the case of a patient from whose stools at the beginning of the illness an agglutinating cholera vibrio was isolated and in whose gall bladder at the post-mortem three weeks later an inagglutinable strain was found; a similar case was reported by CENDIRAPOULO.

H. S.

**FROUIN (Albert) & ROUDSKY (D.). Action bactérielle et antitoxique des Sels de Lanthane et de Thorium sur le Vibrion Cholérique. Action Thérapeutique de ces Sels dans le Choléra Expérimental.—C. R. Acad. Sci. 1914. Aug. 10. Vol. 159. No. 6. pp. 410-413.**

Animal experiments to demonstrate the value of thorium and lanthanum sulphate in the therapy of cholera. Both salts were given by the mouth with no ill effects (1) to two dogs of 12 and 6½ kilo respectively—4 gm. a day for 20 days, (2) to the authors themselves in doses of 4 gm. a day for two days. Ten cc. of a living cholera emulsion, of which 2 cc. given intraperitoneally proved fatal to guinea-pigs in eight hours, were mixed with an equal quantity of 1 or 2 per cent. lanthanum sulphate solution and after standing 30 minutes centrifuged, the deposit being resuspended in 10 cc. saline. Of ten guinea-pigs given 4 cc. (double the dose of untreated emulsion fatal in 8 hours) of this treated emulsion intraperitoneally all survived. Of 10 given 7 cc. two survived and eight died in 24-36 hours. Using an emulsion similarly treated with 1 or 2 per cent. thorium sulphate, of ten guinea-pigs given 4 cc. doses and the same number receiving 7 cc. all survived. These experiments were repeated three times with three different cholera strains. Of four monkeys prepared by the method of PORTEVIN and VIOLLE (a preliminary purging dose of 7-9 gm. of sodium sulphate) and given a Petri dish cholera culture emulsified in 20 cc. broth one died in 30-44 hours, but when six hours after the bacterial emulsion they received by the mouth 40 cc. of a 2 per cent. thorium or lanthanum sulphate solution they survived and suffered no ill effects. If they received twelve hours before 50 cc. of (1) a 2 per cent. thorium sulphate solution death still did not take place (2 animals), (2) a 2 per cent. lanthanum sulphate solution death ensued in 38 and 44 hours (2 animals).

The control monkeys which received no salt solution were given corresponding amounts of water, so that the total amount of liquid should in all cases be the same.

H. S.

**CASTELLANI (Aldo). Note on a Vibrio (*Vibrio Kegallensis* Cast., 1913) isolated from Cases of Paracholera.—Jl. Trop. Med. & Hyg. 1915. Apr. 15. Vol. 18. No. 8. pp. 85-87.**

The three strains of a cholera-like vibrio, one recovered from well water, two from stools of what looked like cholera cases, no other vibrio however being isolated, gave practically all the cultural tests of *V. cholerae*, but differed in agglutinating properties, not clumping with true cholera serum and producing a serum which does not

agglutinate the Koch bacillus. Although unable to demonstrate any pathogenicity in monkeys and rabbits, the author suggests this vibrio may be the cause of cholera-like disease.

H. S.

DÉMETRESCU (C. A.). *Action des endotoxines typhique et cholérique sur les Capsules Surrénales.*—*C. R. Soc. Biol.* 1915. Jan. 8. Vol. 77. No. 33. pp. 591-592.

By injecting subcutaneously into rabbits 24 hours cholera cultures killed at 60° C., the action of the endotoxin on the suprarenal capsules and in particular on the chromaffin substance was tested. In almost all the nine rabbits that the author employed, a complete disappearance of the chromaffin substance resulted; many cells were vacuolated and sometimes the nuclei degenerated. An extract prepared from the suprarenal capsules of inoculated animals contains little or no adrenalin, as evidenced by there being only a slight or even no rise in blood pressure on injecting intravenously into rabbits; the Ehrmann-Meltzer pupillar reaction in the frog's eye is not given, nor is the colour reaction with phosphomolybdic acid.

H. S.

VIOLLE (H.). *Essais sur la Pathogénie du Choléra.*—*Ann. Inst. Pasteur.* 1914. Aug. Vol. 28. No. 8. pp. 759-770. With 2 figs.

On giving a fatal intravenous dose of cholera broth to a rabbit the author noticed that the vibrio could be recovered from the small intestine and that the mucous membrane there showed signs of congestion, particularly below the entrance of the pancreatic duct, which in the rabbit enters about 20-30 centimetres below the pylorus. Scrapings from the surface of the small intestine show everywhere the vibrio but, while above the caruncle of the pancreatic duct there are few, below that point there are many. In the rabbit the entrance of the pancreatic duct is some 20-30 centimetres from that of the bile duct. It is thus possible to suppress either of these two secretions separately if required, tying the pancreatic duct and cauterising the gland to prevent absorption by the blood in the one case and tying the bile duct in the other. It was found that with the pancreatic secretion suppressed, unaltered or stimulated, in no case could death from cholera be induced on injecting vibrios into the small intestine either above or below the pancreatic caruncle, and that a similar negative result was obtained with the bile duct tied if the vibrios were inoculated a few centimetres below the pylorus, but on the other hand if inoculation took place just below the entrance of the pancreatic duct, the animal succumbed rapidly to typical cholera. Only small amounts of broth cultures were needed, as little as  $\frac{1}{4}$  cc. per kilo animal.

The authors searched for a drug to suppress the secretion of the bile but could find nothing capable of doing that except the cholera toxin itself. Given a small, non-fatal amount intravenously, animals then, when further vibrios have been injected into the small intestine below the pancreatic caruncle, develop the disease. The author sees here



an explanation of the mode of attack. Vibrios on being swallowed reach the subpancreatic portion of the small intestine and there, owing to some temporary cessation or lessening of the flow of bile, multiply to some extent; the absorbed toxins still further check the liver secretion and the vibrios invade the whole intestine causing death. He was however unable to induce the disease in rabbits by giving the vibrios per os, after the bile duct had been tied. That bile should *in vitro* be a good medium for cholera vibrios and in the intestine so inimical to them, the author does not regard as remarkable; the action of bile on the mucous membrane, its vessels, cells, glands and nerve endings, and its effect on the other ferments and the bacterial flora in general must be taken into account. The conditions favouring the contraction of the disease the author considers to be: (1) to have the bile and pancreatic ducts situate high up in the intestine; (2) to have a discontinuous flow of bile.

In man these are fulfilled; the deciding factors therefore reside not in the tissues or fluids of the body, but in the anatomy of the digestive glands and their method of secretion.

H. S.

**MERELLI (L.).** *Variazioni biologiche del vibrione colerigeno.* [Biological Variations in the Cholera Vibrio.]—*Pathologica*. 1915. Apr. 15. Vol. 7. No. 155. pp. 179–183.

A number of cholera strains isolated from carriers and patients in 1911 and kept alive for three years by subculturing every one or two months on ordinary agar were found at the end of that period to have remained, beyond the loss of virulence which was easily restored by passage through guinea-pigs, unchanged morphologically, culturally and biologically, except in the case of one strain, which after three years of cultivation, no longer agglutinated with cholera serum, did not give Pfeiffer's test and on injection into animals did not produce a serum which would agglutinate typical vibrios, although much auto-agglutinin was present, nor give the complement fixation test with typical vibrios. On the other hand complement was deviated when a true cholera serum and this altered vibrio were used, thus showing the true nature of the organism in question and the importance of the complement fixation test for establishing group relationships. This spontaneously altered cholera vibrio had in 1912 been subjected to attempts to induce variation artificially but without success.

H. S.

**LIPP (Hans).** *Das Blutbild bei Typhus- und Cholerascchutzimpfung.* [The Blood Cells after Typhoid and Cholera Inoculation.]—*München. Med. Woch.* 1915. Apr. 20. Vol. 62. No. 16. pp. 539–541.

Twelve individuals were examined after inoculation with cholera vaccine. The blood was taken during the morning to avoid confusion with the leucocytosis of digestion. Examination was carried out on the day before, and the first three days after the inoculation, which took place at 5 p.m. and was, as a rule, repeated once and after an

interval of eight days. Little change, with the exception of a slight leucocytosis, is observed in the blood cells. The neutrophile cells sink in some cases from the normal 70–72 per cent. to about 60 per cent., while the eosinophiles rise from the normal 3 or 4 per cent. to 10 or 15 per cent., but soon after the second inoculation the numbers are normal again. In one case, with fever, a more marked leucocytosis was observed (19,000 leucocytes per cmm). the neutrophiles rising to 90 per cent. and the lymphocytes falling from the normal 20–25 per cent. to 3–4 per cent. The author considers this slight leucocytosis after inoculation to correspond with the “negative phase.” [Judging from the three cases where actual figures are given, there seems to be a considerable individual variation in responding to inoculation and it is not clear, for instance, whether the neutrophiles rise or sink in numbers after inoculation with cholera.]

H. S.

**LENTZ (Otto).** *Bereitung des Dieudonné-Agars mit Hilfe eines Blutalkali-Trockenpulvers.* [The Preparation of Dieudonné's Agar with Blood-Alkali Powder.]—*Deut. Med. Woch.* 1915. Apr. 8. Vol. 41. No. 15. pp. 425–426.

Finding that dried Dieudonné blood-agar (three different preparations tried) gave bad results and concluding that this was probably owing to the binding of the free alkali by the serum proteins of the medium, a gradual process which was no doubt hastened by the preparations being supplied in paper wrappings and being thus accessible to moisture, the author tried the effect of drying the blood alkali mixture apart from the agar.

Fresh, defibrinated ox blood was mixed with an equal quantity of normal potash and placed in a steam bath for half an hour. The liquid was evaporated in the shallow trays of a Faust-Heim apparatus under an air current of 37° C., the residue being ground to a powder and kept in a well stoppered glass bottle. Three grams of powder dissolved in 30 cc. water and added to 70 cc. neutral agar gave a Dieudonné blood agar which was ready for immediate use, would keep for 8–10 days and had all the elective properties of the normally prepared Dieudonné medium. The powder was retested after four weeks and found to give as good a medium as when freshly prepared.

H. S.

**VIOLLE (H.).** *Sur un nouveau milieu de culture de séparation pour le vibron Cholérique (Milieu sodo-glycériné).*—*Bull. Soc. Path. Exot.* 1915. Feb. Vol. 8. No. 2. pp. 52–54.

The author prefers for the isolation of cholera vibrios the following medium to Dieudonné's blood agar :—

Nutrient Agar	..	..	..	..	..	87
Glycerine	..	..	..	..	..	10
Normal soda	..	..	..	..	..	3

because it is more easily prepared, ready for immediate use, keeps longer and is transparent, permitting one to distinguish the cholera colonies as small, transparent, slightly raised and rounded, pinhead

growths. Although the vibrios on this medium are shorter, plumper and less motile, they are still easily recognisable and retain their staining properties. By substituting a similar quantity of 2 per cent. peptone water for the nutrient agar an equally good liquid medium is obtained.

H. S.

**McMILLAN** (John Furse). **Asiatic Cholera.**—*Jl. Trop. Med. & Hyg.* 1914. Dec. 1. Vol. 17. No. 23. pp. 354-363.

A somewhat inadequate historical account of the disease with observations from the author's own experience, containing a translation from Thucydides on a "Pestilence" at Athens, which the author considers to have been a cholera epidemic.

H. S.

**SALIMBENI** (A. T.). **Recherches sur la vaccination préventive contre le choléra asiatique.**—*Bull. Soc. Path. Exot.* 1915. Jan. Vol. 8. No. 1. pp. 17-22.

A comparison of the sera of 27 cholera convalescents and 31 individuals inoculated with cholera vaccine. Serum was taken from the cholera patients at different times up to the 88th day after the disappearance of the disease; from the inoculated (three doses of a killed emulsion being given with intervals of five days) from the 5th to the 221st day after the third dose.

In no case was any trace of an antitoxin found. On six occasions serum was tested during the course of the disease or immediately afterwards and found to be completely inactive in respect of agglutinating properties and protective power, the author concluding that recovery takes place without the setting free of antibodies into the blood stream. Only after the 6th, 8th or even 15th day of convalescence does the serum become agglutinative, reaching in the 3rd and 4th weeks its maximum titre of 1/150-1/450, which in two cases that were particularly followed was not lowered even after the 72nd and 88th day. In four cases the titre continued to rise for five weeks and went as high as 1/900-1/2500. Taking into account an observation of **VIOLLE's** that rabbits inoculated in the gall-bladder with cholera vibrios showed a titre as high as 1/10,000, and the knowledge that the vibrio may in man become localized in the biliary passages, the author thinks these high titres obtaining in his convalescents might point to the persistence of the organism in the bile ducts.

In the inoculated agglutinins were always found by the 5th day after the third dose; the maximum was reached between the 12th and 15th day, and the titre began to sink again after two months. In four cases examined during the fourth month the titres were 1/50-1/255, in one case after 186 days it was 1/75, another proved inactive after 204 days, while yet another after 221 days gave a titre of 1/250. In all cases, both convalescents and inoculated, the blood possessed protective properties against intraperitoneal injection of the vibrio into guinea-pigs. By the present laboratory methods there is no way of distinguishing between the serum of a convalescent and that of an inoculated person.

H. S.

SAVAS (C.). *La Dernière Épidémie de Choléra en Grèce (1913) et la Vaccination anticholérique.*—*Bull. Office Intern. d'Hyg. Publique.* 1914. Oct. Vol. 6. No. 10. pp. 1653-1672.

A full account of the prophylactic cholera campaign carried out in Greece on a large scale during the Balkan war of 1913. Early in March, before cases had occurred in Greece, inoculation was commenced; about the middle of May the Greek army and the inhabitants of that part of the country which they occupied were infected by Greek refugees, coming from regions where fighting and cholera were already rampant. In June Greece went to war. By the end of June the inoculation of the army was complete and the number of cases of cholera sensibly diminished. The epidemic was over by the end of October. The army was provided with cholera ambulances, each one consisting of a mobile detachment (travelling laboratory and disinfecting corps) and a more stationary one (for the transport and treatment of cases). In the spreading of the disease the chief factors were contact with infected persons, and flies; against the latter no measures could be taken during the campaign. In the isolation hospitals both soldiers and civilians were brought together. Between 5,200 and 5,300 cases in all were treated in hospital with between 1,165 and 1,700 deaths, roughly a case mortality of from 22 to 32 per cent.

KOLLE'S method of preparing a vaccine was followed. A recently isolated virulent strain, which was typical in every respect, including agglutination and complement fixation, was taken; its virulence was still further raised and kept raised by repeated passage through guinea-pigs. Grown on agar the culture was emulsified in physiological saline so that 1 cc. = 4 mg. vibrios, and killed at 50° C., .5 per cent. phenol being added subsequently. Dosage was .1 cc. under 1 year of age, .2 cc. for 1-3, .3 cc. for 3-5, .5 cc. for over 10. After eight days double the amount was given, which completed the treatment. All persons with a raised temperature, or serious heart or kidney trouble and the newly born were exempted. In all about 500,000 were inoculated. In some cases within a day or two of injection the inoculated developed fulminating cholera and died. The author suggests that this points to the existence of a negative phase. [It may well be that in these cases inoculation took place during the incubation period.]

It was found that inoculation did not interfere with the fighting capacity of the troops, but on the contrary, owing to their faith in the efficacy of the measure, it raised their morale considerably. In eleven divisions of the army inoculation was carried out to the following extent and with the following disease incidence occurring: 14,613 inoculated once, 4.2 per cent. developed the disease; 91,224 inoculated twice, .7 per cent. developed the disease; 8,968 not inoculated, 9.3 per cent. developed the disease. The mortality figures of the anticholera ambulances and the hospitals in Salonika were as follows: among 433 inoculated once, 12.2 per cent.; among 376 inoculated twice, 10.2 per cent.; among 1,113 not inoculated at all 27.5 per cent.

With regard to the treatment of cases with anticholera serum opinion was divided, but on the whole it was decided that there was little result from its employment. From the use of iodine no benefit was observed.

H. S.

**DOPTER (Ch.)** *La Prévention du Choléra par les Vaccinations anticholériques.*—*Ann. d'Hyg. et Méd. Légale.* 1915. Feb. Vol. 23. pp. 65–67.

A plea for preventive cholera inoculation, with a few statistics and data gained from the Greek cholera inoculation campaign during the Balkan war of 1913, which has been reported on more fully above.

H. S.

**VINCENT (H.)** *Sur la Vaccination expérimentale contre le vibron du choléra par la vaccin stérilisé par l'Ether.*—*C. R. Acad. Sci.* 1915. Mar. 22. Vol. 160. No. 12. pp. 378–380.

Cholera cultures (24 hours on agar at 38° C.) are emulsified in physiological saline and shaken with ether, giving a somewhat thick and whitish supernatant fluid which is poured away leaving a sterile and translucent underlying liquid, the vaccine. Guinea-pigs immunised with a vaccine of this kind withstand a subsequent lethal intraperitoneal dose of vibrios better than if a vaccine killed by heating to 56° C. for one hour were used. The comparison is based apparently on an experiment on one guinea-pig inoculated with a heated vaccine. The author summarises the advantages of a vaccine sterilised by ether as follows :—

1. Sterilisation is almost immediate.
2. Useless lipid substances are extracted with the result that the vaccine is less toxic.
3. The vibrios are broken up which favours bacteriolysis *in vitro* and a rapid resorption *in vivo*; thus antibody formation is quickly set up, a matter of importance in a disease which like cholera has a short incubation period.
4. A general method for preparing bacterial vaccines is established, vaccines which, while possessing the advantages of living ones, are not accompanied by the danger usually attached to their use.

H. S.

**BUIWID (O.) & ARZT (L.)** *Ueber Cholerashutzimpfung (Bisherige Beobachtungen über die Beeinflussung der Morbidität und Mortalität als Folge der Vakzination.* [On Prophylactic Cholera Inoculation.]—*Wien. Klin. Woch.* 1915. Feb. 18. Vol. 28. No. 7. pp. 172–175.

A consideration of the case mortality and degree of severity of attack in inoculated soldiers who acquired cholera round Cracow

chiefly during November and December of last year. The following table of the author summarises the observations :—

Number of cases.	Divided among different corps.	The attack was			
		light in	medium in	severe in	fatal in
63	39	28 = 44·5%	6 = 9·5%	25 = 39·7%	4 = 6·3%

Of these 63 cases 16 were inoculated less than a week before the onset of the illness and consisted of 9 light, 2 medium and 5 severe cases, with no deaths, which would suggest the absence of a negative phase.

The mortality among the uninoculated troops was over 30 per cent. No figures were available for a comparison of the incidence among the inoculated and uninoculated.

H. S.

## AMOEBIASIS AND DYSENTERY.

## AMOEBIASIS.

SELLARDS (Andrew Watson) & BAETJER (Walter Albert). **The Recognition of Atypical Forms of Intestinal Amoebiasis.**—*Bull. Johns Hopkins Hosp.* 1915. Feb. Vol. 26. No. 288. pp. 45-52. With 1 plate.

This paper contains an interesting account of three obscure cases of dysentery and diarrhoea occurring in Baltimore last winter (1914-15). The cases are of interest from the fact that they presented variations from the usual chronic form of amoebic infection and, as the authors remark, "in looking for unusual types of chronic infection it is conceivable that these might occur, not primarily in the tropics where the optimal conditions prevail for the development and propagation of the disease, but rather in the North where the disease must maintain itself under unusual and adverse conditions." In the three cases observed, the general health of the patient was comparatively good and the principal symptom was the annoyance of frequent stools. The disease in each case ran a *continuous* course over a period of several years *free from any intermission* or remission of symptoms. Stools were usually frequent, contained much water and but little or no blood and mucus. Microscopical examination of the excreta sometimes showed amoebae but the characteristic *Entamoeba histolytica* was absent. The amoebae did not disappear after the injection of emetine nor did the symptoms yield to this drug. The clinical histories of the patients presented few points in common with amoebic dysentery. In two of them, however, there had been in the early days of the disease a history of definite dysentery. Also while one of the patients was under observation periods frequently occurred in which a considerable quantity of blood appeared in the stools but in the intervals watery diarrhoea only prevailed. In such cases, as the authors admit, it is of extreme importance to identify the species, while absolutely accepting, as the authors do, the view that there are but two parasitic amoebae of man one of which, *E. histolytica*, is pathogenic and the other, *E. coli*, non-pathogenic.

Case I.—Typical dysentery with bloody mucous stools, 10 or 12 years ago in Egypt. Probably intermissions during early years of the malady but in past few years no intermission. Up to 20 stools per day—watery and containing no blood and no mucus. Amoebae in stools very scarce, of small size and sluggishly motile. Cytoplasm somewhat hyaline and no differentiation of ectosarc from endosarc. No included red cells (no blood in stools). Nucleus easily seen and richer in chromatin than either *E. histolytica* or *E. coli*. The chromatin was arranged in rather large irregular masses. *Cyst-like bodies found with 1, 2 and 3 nuclei and only after long search was one found with 4 nuclei.* These gross differences between the amoebae found and *E. histolytica* did not justify a diagnosis of amoebic dysentery without further investigation as to their pathogenic action. *Cultivation on various media failed.* Faecal material (rich in flagellates but containing not more than 1 or 2 vegetative amoebae in a coverslip preparation and no 4-nuclei cysts, though cyst-like bodies with 1, 2 and 3 nuclei were abundant) was injected into a kitten in three localities, viz. directly into caecum, into ileum (1 foot above ileo-caecal valve) and into stomach (6 cc. in each locality). No amoebae or flagellates appeared in the stools during the next few weeks and no clinical symptoms.

In the 5th week frequent loose stools were passed containing a few motile amoebae. Cultures negative. No blood or mucus in stools. General health of animal unimpaired. The amoebae in the kitten's excreta were slightly larger and more active than those in the patient and there was some differentiation between ectosarc and endosarc. Nucleus was poorer in chromatin but still richer than *E. histolytica* or *E. coli*. Cysts with 4 nuclei not uncommon and occasionally cysts with 5 or 6 nuclei. After two months diarrhoea diminished and amoebae became less numerous. The animal was killed but, apart from a few hyperaemic areas, there were no definite lesions in large bowel. Material from this kitten at autopsy was injected into two young kittens. Both showed signs of infection after 5 days and 10 days incubation respectively. The one kitten died from some unknown cause on the 6th day. Its large bowel showed a moderate degree of hyperaemia. Amoebae were abundant in the bowel contents and in character they approached the *E. histolytica* type. The other animal died three weeks after inoculation. The small bowel was intensely injected in the lower half of ileum, the hyperaemia ending sharply at the ileo-caecal valve. Contents of large bowel were seropurulent and many amoebae were present. These were smaller than the parasitic forms but resembled *E. histolytica* more closely than the original forms in the patient.

Case II.—Boy of 14 years. Nine and a half years ago he contracted diarrhoea which lasted only a few weeks. A year later it returned, 3-5 stools being passed per day with occasional discharge of blood. The latter disappeared and since that time the diarrhoea persisted in a watery form. Emetin and ipecacuanha of no benefit. Chaparro amargosa tried but discontinued owing to nausea. The amoebae intermediate in character between *E. coli* and *E. histolytica*, but the comparative richness of the nucleus in chromatin would not permit a definite diagnosis of *E. histolytica*. A kitten inoculated with faecal material developed after three days a sharp dysentery with blood and mucus. It recovered before satisfactory specimens could be obtained for study.

Case III.—No definite history of amoebic dysentery, but frequent attacks of diarrhoea. During past 18 months, diarrhoea constantly present. Emetin and ipecac. of little benefit. No trophozoites found but scrapings from the ulcers (rectoscopic examination) showed cyst-like bodies with 1-3 nuclei. No 4-nuclear forms. An inoculated kitten developed after one month's incubation a watery diarrhoea like that of the patient. Amoebae abundant and not differing essentially from those seen in first passage from Case I. Symptoms persisted in kitten for one and a half months, and then became much milder. After two months the animal was killed. No lesions found.

The authors conclude that the amoebae from these cases are pathogenic for kittens and, in the absence of other adequate causes in explanation of the diarrhoea, were aetiological factors in producing the symptoms in the cases described. In the author's opinion the virulence and other biological characters of *E. histolytica* are subject to some variation and with changes in environment morphological changes may also occur. These variations occur both in the trophozoites and in the encysted stage. Features such as the amount of chromatin and its arrangement in the nucleus are not absolutely fixed characters but are subject to more variation than has been suspected. A more surprising phenomenon is the liability to variation in the number of nuclei in the cysts. The observation of HARTMANN that *E. histolytica* when infecting lower animals undergoes definite morphological changes offers further evidence in support of the view that the atypical strains described have developed from *E. histolytica*. By passage these atypical forms tended to return to the *histolytica* type.

An excellent plate accompanies this paper.

J. C. G. Ledingham.



DEBUYS (L. R.). **Amebic Dysentery in Children.**—*Amer. Jl. Obstet.* 1914. Sept. Vol. 70. No. 441. p. 509.

Amoebic dysentery is not considered common amongst children because they are less exposed to the predisposing factors than are adults. It is however commoner than is believed, especially in New Orleans. In the Children's Hospital four cases in children were found in a series of 3,000 [see this *Bulletin*, Vol. 5, p. 202.]

P. H. Bahr.

JONES (Glenn I.). **The Treatment of Intestinal Amebiasis.**—*Jl. Amer. Med. Assoc.* 1915. Mar. 20. Vol. 64. No. 12. pp. 982-983.

A brief paper, pointing out that though emetin is one of the most valuable agents in the treatment of intestinal amoebiasis hypodermics of emetine alone will not cure amoebic dysentery. The author had an experience of 50 cases in the Philippines and came to the conclusion that most cases of amoebiasis can be cured by administration of emetin hypodermically, accompanied or followed by ipecacuanha given orally. Ipecac alone, like emetin alone, will not prevent relapses. The author unfortunately does not classify his 50 cases into two groups according as single or combined treatment was employed. At the Department Hospital, Manila, the following is the routine treatment: emetin hydrochloride 0.008 gm. hypodermically for 10 days (twice a day for four days and once a day for six days). Ipecac is given about the 8th day, 1.5 gm.-2 gm. doses at bed time continued for three consecutive nights and thereafter decreased by 0.3 gm. each consecutive night. The administration of ipecac. should be preceded by Tinct. opii in doses of 0.6-1 gm. In the author's view it should always be borne in mind that emetin is an amoebicide and has little to do with the healing of ulcerations. Every case after this treatment should be regarded as one of ulcerative colitis and suitable dietetic measures should be taken.

J. C. G. L.

van den BRANDEN (F.) & DUBOIS (A.). **L'Amibiase et son traitement par l'Émetine à l'Hôpital des Noirs, Léopoldville, Congo Belge.**—*Bull. Soc. Path. Exot.* 1915. May. Vol. 8. No. 5. pp. 332-338.

Amoebic dysentery is far from rare at Leopoldville in the Belgian Congo. The mortality is high among chronic hospital cases and the use of emetin has not diminished the incidence though it has considerably reduced the mortality. The authors studied 41 cases, including one which was complicated by abscess of the liver. When they commenced the use of emetin, they gave it subcutaneously in doses of 0.02 gm.-0.10 gm. per day. Later they gave the drug intravenously, 0.10 gm. per day dissolved in 10 cc. of saline. It was well tolerated and caused no irritation of the kidneys. The intravenous injections acted more promptly and energetically than the subcutaneous injections. They were moreover not painful and accordingly were more readily tolerated by the blacks. The following figures indicate the reduction in mortality since the introduction of emetin: 1911, 60 per cent.; 1912, 53 per cent.; 1913 (emetin) 15 per cent.; 1914, 17 per cent. Notes of all 41 cases are given in tabular form with doses employed and mode of administration.

J. C. G. L.

**NIXON (P. I.). Chaparro Amargosa in the Treatment of Amoebic Dysentery.**—*Amer. Jl. Trop. Dis. & Prevent. Med.* 1915. Mar. Vol. 2. No. 9. pp. 572-584.

The author believes that Chaparro amargosa is the most efficient remedy we have at present for the treatment of amoebic dysentery, with the possible exception of emetine. It was introduced by J. W. NIXON of Gonzales, Texas, in 1893 as an antidysenteric remedy and the drug is on the market as a fluid extract, the dose being 1-3 fluid drams before meals. Nixon employs an infusion prepared by boiling for 30-60 mins. the roots, branches, foliage and fruit of the plant, which is indigenous to south-west Texas and north Mexico. His routine treatment is as follows:—The patient is kept in bed, if possible, on diet restricted to liquid or semi-liquid food. One oz. of mag. sulph. is given three or four hours before treatment is begun and repeated every 3-4 days. Six or eight ounces of the infusion are given by the mouth half an hour before each meal. Rectal enemata of 500-2,000 cc. are also given in the knee-chest position twice a day and the patient is instructed to maintain the position for 5 or 10 minutes and afterwards to retain the fluid as long as possible. The treatment is continued for a week or two after the subsidence of all symptoms. The infusion has a very bitter taste which is easily overcome by eating a piece of bread or drinking a little coffee. No nausea has followed its administration. In ordinary diarrhoea the drug is not indicated and it is without action on other intestinal parasites (1 case of *Strongyloides*, 1 of *Balantidium coli* and 3 of *Cercomonas intestinalis*). Data concerning 12 cases treated by this drug are given. The symptoms ceased immediately in all cases. One case disappeared from observation after three months, one case was well for 10 weeks, one for 3 months, two for 1 year, one for 2 years and five for more than 2 years. There was one recurrence in a case insufficiently treated. No liver abscess or other complications.

J. C. G. L.

**MINK (O. J.). Salvarsan in a Case of Amebic Dysentery.**—*U. S. Naval Med. Bull.* 1914. Oct. Vol. 8. No. 4. pp. 653-654.

The patient contracted dysentery in Nicaragua in September 1912 and received all the usual treatments including appendicostomy. During past three months, amoebae still active in stools in spite of vigorous treatment with emetin, ipecacuanha and quinine irrigations. On July 9th, 1914 the patient received 0.6 gm. salvarsan intravenously and on July 18th passed the first solid stool for five months. Stools continued solid and no amoebae appeared after vigorous saline catharsis. The improvement after salvarsan was apparently very rapid and marked. [It would be of interest to know whether the patient had also syphilis.]

J. C. G. L.

**RAZZETTI (L.). El Metodo de Rogers en la Amibiosis hepatica. Observaciones de dos abcesos hepaticos curados con la emetina.** [Two Cases of Hepatic Abscess cured with Emetine.]—*Gaceta Med. de Caracas.* 1915. Jan. 15. Vol. 22. No. 1. pp. 6-7. With 1 chart.

Two cases of liver abscess in which the author was able to dispense (C170)-

with any open operation, the pus being merely drawn off with the large trocar of a Potain's aspirator. The cavity was then filled through the same trocar with about 100 cc. of physiological salt solution containing 10 centigrammes of hydrochlorate of emetin in solution. An anaesthetic is not needed for this operation, the puncture being closed with a pad of gauze and collodion. The author remarks that the treatment of liver abscess is thus brought within the reach of every general practitioner. In the first case two aspirations were necessary, and in the second only one, the entire treatment in the latter case only occupying 16 days. The usual hypodermic injections of emetin were given in addition.

J. B. Nias.

**STRINE (H. F.). Emetin in the Treatment of Amebic Abscess of the Liver.**—*U.S. Naval Med. Bull.* 1914. Oct. Vol. 8. No. 4. p. 653.

Dysentery was contracted in October 1913. Treatment for six weeks with emetin 1/3 gr. ter die. In May 1914 the patient enlisted in the U.S. Navy while in excellent health. In July 1914 he was admitted to hospital. No amoebae in stools; right lobe of liver enlarged. On July 12th 200 cc. of pus were evacuated from an abscess. Amoebae were not demonstrated in the pus.

J. C. G. L.

**PASLEY (Claude Burgoyne). Two Extraordinary Cases of Liver Abscess.**—*Lancet.* 1915. May 22. pp. 1076-1077. With 3 figs.

The author records two cases of liver abscess which were remarkable for their enormous size, both practically filling the abdominal cavity. There was no jaundice in either case and both made a successful recovery after evacuation of the abscess cavities. In the author's opinion no case of liver abscess however large, or however ill their possessors may be, need be considered hopeless.

J. C. G. L.

**WALTON (H. J.). A Case of Urinary Amoebiasis.**—*Brit. Med. Jl.* 1915. May 15. pp. 844-845.

The writer, who is Professor of Pathology at Lucknow, commences with a reference to the few published cases of this rare and interesting condition. BÄELZ's case occurred in a Japanese woman, entamoebae being found both in the bladder and in the vagina and BÄELZ was of opinion that the parasites were introduced into the vulva with the water used for washing the parts, thence penetrating into bladder and vagina. The amoebae in this case were very motile and had a diameter of about 50 $\mu$ . It was not stated whether the parasites contained red cells though the urine was described as sanguineous\*. Walton's own case was briefly as follows:—Male 18, Brahmin, admitted to Hospital, Lucknow, 12th May, 1914. Had been suffering from hematuria for six months and from anasarca of the legs, penis and scrotum for three weeks. Small superficial ulcer on glans penis with

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\* See also this *Bulletin*, Vol. 5. p. 200.

slight sero-sanguineous discharge. No treponemata found. Inguinal glands not enlarged. Stools healthy and no entamoebae found. Patient stated that he had never suffered from dysentery. Urine scanty and deeply blood stained, acid, Sp. Gr. 1013. Much albumin, pus, red cells, and hyaline and granular casts. Also numerous actively motile entamoebae.

Emetine was given in  $\frac{1}{2}$  grain doses twice a day hypodermically. In 48 hours, the amoebae were much diminished in numbers and more sluggish. On the third day the urine was much clearer and not tinged with blood; reaction alkaline, little albumin and no active amoebae seen. On May 17th, there were no amoebae in the urine and emetine was discontinued. Patient felt much better. On May 21st, the swelling of the legs had gone though that of penis continued. The sore had healed. The stools were examined almost every day and no entamoebae were found in them till June 5th when a few sluggishly motile entamoebae, which seemed to be *E. tetragena*, were detected. At this time there were no amoebae in the urine. The administration of emetine was resumed and the entamoebae disappeared from the stools within two days. The patient was still under treatment. Urine was free from blood and no amoebae had been found in it since they disappeared on May 17th nor had amoebae been observed again in the stools.

With regard to the characters of the amoebae found in the urine, "they were specially characterised by their active motility and by the unusual persistence of motion in one direction. As a rule, a single hyaline lobose pseudopodium was protruded in the direction in which the amoeba was travelling; as soon as the granular endoplasm had flowed into it a fresh ectoplasmic pseudopodium appeared at the same place. In this respect the entamoebae differed from the ordinary forms of *E. tetragena* and *E. coli*, which frequently produce pseudopodia simultaneously at different parts of their surface, and often alter the direction of their motion."

Spherical or oval resting forms were also seen, varying in diameter from 25–35 $\mu$ . The cytoplasm in both the active and resting stages was coarsely granular with numerous vacuoles. Nearly all the amoebae contained red cells (10 on the average). No included bacteria and no free bacteria present in the urine. No distinction in active amoebae between ectoplasm and endoplasm except in the pseudopodia. Owing to the great activity of the amoebae and persistence of motion in one direction, they generally assumed a narrow elongated form attaining a length of 50–60 $\mu$  with a breadth of 10–20 $\mu$ . In most of the living active amoebae no nucleus was discernible. In a few however, a spherical nucleus about 4 $\mu$  in diameter could be seen. In preparations fixed in Schaudinn's solution and stained by iron-alum-haematoxylin, the cytoplasm was very vacuolated and there was no definite nuclear membrane. In some cases much chromatin was collected at the periphery of the nucleus. Fixed specimens measured 18 $\mu$ –35 $\mu$ . Infection experiment was tried in one kitten, 4 oz. of urine being injected per anum as far up the colon as possible. The kitten did not become infected. Cultivation on Musgrave and Clegg's medium also failed.

Encysted forms were found neither in the urine nor in the stools. The writer considered it impossible to be quite sure of the species of entamoeba concerned but in all probability it was identical with *E. tetragena*. The mode of access of the amoebae to the urinary tract

appeared to be fairly obvious. Entamoebae were present in the stools (otherwise normal) on two consecutive days and their characters agreed with those of *E. tetragena*. As it is customary among the Indians to wash the anus and perineum with water after defaecation it is easy to understand a transference to the urethra. Perhaps an abnormal condition of the urine is necessary to enable the amoebae to establish themselves. Chronic nephritis (as in this case) is common enough in India as also intestinal amoebiasis. Consequently opportunities for infection of the urinary tract must be frequent and possibly urinary amoebiasis is commoner among Indians and other Asiatic races than is generally supposed.

J. C. G. L.

**COURET (Maurice).** A Study upon Amoebae cultivated from the Normal Human Intestine.—*Amer. Jl. Trop. Dis. & Prevent. Med.* 1915. Jan. Vol. 2. No. 7. pp. 450-464. With 1 plate.

In this paper the author records the results of his experiments with free living amoebae, cultivated from the intestines of healthy human subjects and of lower animals, and from external sources. The indications are that such amoebae may be propagated in the tissues of man or of lower animals when symbiotic bacteria are present.

Faeces of 200 apparently non-dysenteric persons were examined before and after the administration of a mild laxative; those examined included inmates of the Charity Hospital, New Orleans, students of Tulane University, and others; amoebae in various stages were found in 41 cases. Of those able to be observed for two to four months none showed clinical evidence of intestinal "upsets."

Attempts were made to cultivate the amoebae obtained on various media. The organisms approximated to: *Amoeba fecalis*, Walker; *A. cobayae* and *A. musculi*, Walker; *A. intestinalis* and *A. gall-favoris*, Walker; *A. hominis*, Walker; *A. lobosa guttula* and *A. diaphana*, Celli and Fiocca.

Experiments were made on animals to determine whether the amoebae produced lesions or were harmless commensals. The cultures were started from one amoeba. When a symbiont was required, it was chosen from those organisms best suited to the parasite.

"The experiments were divided into seven groups:—

"Group I.—The animals were fed on cultures of one species of amoeba in sterile milk and water.

"Group II.—Animals were given a mixture of several species of amoebae and their original symbiotic organisms, in milk and water.

"Group III.—Animals received high rectal injections of suspensions of several species of amoeba with one or more symbiotic micro-organisms. The symbiont was chosen from bacteria most likely to produce lesions.

"Group IV.—Animals were injected into the liver with a single species of amoeba in symbiosis with *V. cholerae*, *B. typhosus*, *B. dysenteriae* or *B. coli*, alone or in combination with each other.

"Group V.—Animals injected into the liver with encysted amoebae free from symbiotic micro-organisms.

"Group VI.—Were first immunized against *B. cholerae* and subsequently, cultures of all species of amoebae in symbiosis with the cholera vibrio were injected into the liver.

"Group VII.—Animals injected with the bacteria alone used as symbionts to the amoebae."

The results of 16 experiments are detailed. Kittens, cats and monkeys were used.

The author concludes :—

“ Free-living amoebae and amoebae cultivated from the healthy intestine cannot produce typical amoebic lesions in the gastro-intestinal canal or the liver of susceptible animals when introduced in pure cultures or with favourable bacterial symbiosis. When either one or several species of amoebae were fed to animals or injected into their rectum with bacterial associations, the results were negative unless the symbiotic micro-organism was capable of producing an intestinal upset. When pure cultures were used no results were obtained. Animals injected into the liver with suspensions of one or many species of amoebae either in pure culture or associated with some micro-organism, failed to show lesions when the bacteria were omitted or were not pathogenic. Positive results were obtained only when the bacterium in symbiosis was pathogenic to the host. In every instance, the lesions when present did not suggest amoebic invasion. Negative results followed when the amoebae and their symbionts were injected into the liver of an animal previously immunized against the bacterium, although lesions followed the injection of the same amoebae with the same symbiont, in an animal not protected against the symbiotic organism.

“ Control animals that were fed or injected with the various bacteria used as symbionts, without the amoebae developed the same symptoms, died as frequently and the lesions were similar to those in which the amoebae were injected with the special microorganism.”

H. B. Fantham.

KUENEN (W. A.). *Sur la Dysenterie amibienne.*—*Far East. Assoc. Trop. Med. C. R. Trois. Congrès Biennal. Saigon* (1913). 1914. pp. 44-54. With 4 plates.

In this paper the author gives an interesting account of *Entamoeba coli* and *E. histolytica*. The morphology of these parasites is well illustrated in the four plates, containing over 80 figures.

For differential diagnosis of the entamoebae he recommends mixing fresh preparations of infected faeces with eosin or with methyl blue or with dilute tincture of iodine. The nuclei of the cysts are thus stained and can be counted.

The life-cycle of *E. histolytica* is divided into three stages :—The *histolytica* stage in the tissues, the saprozoic *minuta* stage, and the cysts. Emetine easily acts on the *histolytica* stage. The *minuta* and encysted stages occurring in the faeces are more resistant. In liver abscess the author only found *histolytica* forms.

H. B. F.

BASS (C. C.) & JOHNS (F. M.). *Pyorrhea dentalls and alveolaris. Specific Cause and Treatment.*—*Jl. Amer. Med. Assoc.* 1915. Feb. 13. Vol. 64. No. 7. pp. 553-558. With 9 figs.

The authors found pyorrhea dentallis and alveolaris very prevalent, 95 per cent. of the adults examined by them in New Orleans being infected. They have studied more than 300 cases. Pyorrhea dentallis is the name given to the early stage of the disease. They consider that *Endamoeba buccalis* is the cause of the pyorrhea. The endamoebas develop and live in the dead or dying tissue at the bottom of the lesions

or pockets. The amoebae vary in size, but are about that of *E. histolytica*. The ectoplasm is seen at the time of pseudopodia formation and the endoplasm contains granules resembling portions of red cells. Only a few endamoebae are present in the material from the surface, which consists chiefly of bacteria, spirochaetes and pus.

The authors have treated the disease with emetine, either administered hypodermically or internally by the mouth. In all ordinary cases half a grain of emetine hypodermically is the proper daily dose. They have also tried the use of a drop or two of fluid extract of ipecacuanha in half a glass of water for rinsing the mouth at night before retiring. For internal treatment by the mouth they recommend a commercial preparation of the alkaloids of ipecacuanha called Alcresta ipecac. Apparently this preparation contains hydrated aluminium silicate. Two or three tablets should be taken two or three times a day. The authors' summary is as follows:—

"1. Pyorrhea dentalis and alveolaris is practically a universal disease, which leads to the loss of the teeth by a long suppurating process. All people have it sooner or later. It begins in early adult life or earlier.

"2. The specific cause of the disease is *Endameba buccalis* and possibly other species, which infect and destroy the peridental membrane. The pyorrhea results largely from the secondary infection.

"3. The demonstrable endamebas can be destroyed by giving  $\frac{1}{2}$  grain of emetin hydrochlorid hypodermically for three to six successive days.

"4. Apparently equal endamebacidal effect is produced by two or three Alcresta ipecac tablets (Lilly) taken by mouth three times a day for four to six successive days.

"5. The lesions require variable lengths of time to heal, but many could not reasonably be expected to heal in less than several weeks or months.

"6. The treatment must be repeated from time to time until the lesions all heal, on account of relapse, or probably reinfection of the lesions as a result of the great prevalence of the infection.

"7. Injecting ipecac or emetin into the worst lesions ought to be of service and can be carried out by patients in many instances.

"8. Rinsing the mouth thoroughly with a solution of fluid-extract of ipecac is believed to protect, to some extent, against reinfection, and actually cures the disease in its earliest stage in some instances."

The paper is illustrated by seven photomicrographs and two diagrams.

[In an editorial on "Endamebas and pus pockets about the teeth" in the same journal (p. 593), it is remarked that "this disease should . . . be considered a pericementitis rather than an alveolitis."]

H. B. F.

SMITH (Allen J.), MIDDLETON (William S.) & BARRETT (M. T.). The Tonsils as a Habitat of Oral Endamebas. Possibility of Systemic Complications of Oral Endamebiasis.—*Jl. Amer. Med. Assoc.* 1914. Nov. 14. Vol. 63. No. 20. pp. 1746-1749.

The authors refer to the earlier work of SMITH and BARRETT indicating that the parasitic amoebae of the mouth "hold an important relation in the etiology of pyorrhea alveolaris or Riggs' disease," and that emetine is useful as an amoebicide in the disease. They consider that there is reason to suspect "an important symbiotic relation between the protozoa and the bacteria" of the mouth in the disease.

In the present paper they deal with the occurrence of endamoebae in the tonsils. Seventeen cases were examined, five of which showed motile amoebae of the type of *Endameba buccalis*. All the cases were suffering from chronic tonsilitis, usually with tonsillar hypertrophy. They also think that the amoebae may be connected with certain arthritic affections and certain obscure pernicious anaemias. The toxic states determining either the arthritides or the anaemias may possibly be due to the oral conditions. Emetine appeared to be of service in the treatment of these cases.

H. B. F.

#### BACILLARY DYSENTERY.

**MANTEUFEL.** Untersuchungen über die Bazillenruhr in Deutsch-Ost-Afrika. [Investigations on Bacillary Dysentery in German East Africa.]—*Zeitschr. f. Hyg. u. Infektionskr.* 1915. Jan. 15. Vol. 79. No. 2. pp. 319-335.

This communication deals with the bacteriology of an outbreak of bacillary dysentery in German East Africa at Dar-es-Salam. Dysentery bacilli were demonstrated for the first time in this colony in the beginning of 1913 when an epidemic occurred among the natives at Dar-es-Salam. Later, Indians and Europeans were attacked. The cases were benign and generally cleared up in a few days. The administration of Uzara was very useful. From April 1913 to 31st March 1914, 161 cases of dysentery were examined with the result that 45 proved to be cases of bacillary dysentery, 9 of amoebic dysentery while 107 gave negative findings. Of the 45 bacillary cases, 15 gave positive agglutination and positive stools, 21 gave positive agglutination and negative stools and 9 gave negative agglutination and positive stools.

The author proceeded to test 16 isolated strains by agglutination and fermentation reactions, at the same time comparing them with a series of stock strains of Shiga and Flexner obtained from various German institutes. Nine strains were agglutinated nearly to the titre limit by immune Flexner serum, two being probably identical with B. Flexner and seven with Bac. Y. A few strains isolated from dysenteric stools gave gas in glucose and, though the author hesitates to enrol them in the Dysentery group, he is inclined to think they may have been causally connected with the disease in view of the fact that the patients' sera agglutinated them. [These gas forming bacilli are not described in detail and we are not informed of the agglutination titre reached by the patients' sera. The fact that they were agglutinated by an *immune Flexner serum* obtained from Dresden is of little moment, as this particular serum is shown by the author to have been incapable of differentiating B. Shiga from B. Flexner.]

No strains were found to give the fermentation and agglutination reactions of B. Shiga. Some curious variations are noted; e.g. one strain, which was agglutinated by a Shiga serum, gave acid on mannite and maltose. Another strain which had not fermented mannite or maltose after seven days was only slightly affected by Shiga serum but agglutinated nearly to the titre limit by a Flexner serum. The employment of mannite as the sugar for differentiating between B. Shiga and the great group headed by B. Flexner, Bac. "Y" and Bac.



"Strong," etc., should, in the author's opinion, be given up and he quotes in support an observation of BUTJAGIN who noted the acquisition of Flexner sugar reactions by a Shiga strain which had been passaged for 1½ years on agar. [The use of mannite in this connexion will not lightly be given up and certainly not as the result of isolated observations of this character. The necessity of establishing on a sound basis far-reaching variations of this character, by accurate, long-continued research, does not require to be insisted upon.]

The use of maltose in the differentiation of Flexner from Y, the reaction on litmus milk and the indol reaction, are admittedly variable characters in the mannite fermenting group. [At the same time, the employment of the term "Y" type for strains which, on their first isolation, fail to ferment maltose and produce little or no indol is a very convenient working rule and not improbably the distinction may be found to be correlated with a clinical difference.] The author's conclusion that even the differentiation of toxin-production breaks down and that certain strains of Shiga have this property only slightly developed was only to be expected after his views on the mannite test. His proposal to group all Dysentery bacilli irrespective of fermentation reactions (Shiga and Flexner alike) into one common genus with subtypes or races arranged according to their reaction with immune sera prepared by immunising with Kruse strains A, B, D and E and the original Shiga-Kruse strain, is not likely at present to receive much support.

J. C. G. L.

RIBEYRO (Ramón E.) & BAMBARÉN (Carlos A.). **La disenteria bacilar existe en Lima.** [Existence of Bacillary Dysentery in Lima.]—*Cron. Med. Lima.* 1915. Jan. Vol. 32. No. 619. pp. 3-5.

Hitherto only amoebic dysentery has been recognised in Lima, but the authors are now able to put on record a case of the bacillary variety of the disease. The patient was a man, aged 20, a native of the country, who entered the local hospital with symptoms of dysentery and was treated for ten days with emetin injections without success, on the supposition that the complaint was amoebic. Large doses of bismuth internally were equally ineffective. A more detailed examination of the case revealed no amoebae in the stools, but on the other hand the patient's serum agglutinated the Shiga bacillus in a dilution of 1:500. With samples of B. Kruse and B. Flexner agglutination ceased at 1:50. On the strength of these findings the patient was treated with hypodermic injections of DOPFER's anti-dysenteric serum, procured from the Pasteur Institute at Paris, with satisfactory results.

J. B. N.

GETTINGS (H. S.). **Bacillary Dysentery.**—*Trans. Soc. Trop. Med. & Hyg.* 1915. Feb. Vol. 8. No. 4. pp. 111-125.

This paper deals with certain aspects of bacillary dysentery as met with in Northern climates, but more especially in the British Isles, where it may be taken as an index of the sanitary condition of the community. From its history bacillary dysentery is essentially an

epidemic disease, especially in lunatic asylums where apparently its incidence is as marked as ever. It is a mistake to call bacillary dysentery a tropical disease; it is prevalent there only because of the insanitary conditions. A detailed account is given of the various historic outbreaks of dysentery during Marlborough's and the Napoleonic campaigns. The disease prevails only to a small extent in armies under peace conditions; thus during the year 1909 only 137 cases were registered in the French army. In English lunatic asylums there have been numerous cases during the last few years; in 1909 for instance there were 1,159 cases with 270 deaths. In Wakefield asylum dysentery has existed since its inception in 1818 and it has lingered there till the present day. In 1911 there were nearly 300 cases in spite of sanitary measures of all kinds which have been introduced. In Scottish asylums dysentery is rare, probably because they are not crowded to the same extent.

As regards the bacteriology, Flexner's bacillus was isolated from 50 per cent. of the cases when the epidemic was at its height and considerable minor variations in the sugar reactions were given by various colonies of dysentery bacilli isolated from the same stool. Morgan's bacillus No. 1 was found in a few cases. The agglutination reaction of dysenteric sera was found to be very unreliable. It is probable that the epidemics originate and are kept up by bacilli carriers, but in an asylum it is especially difficult to detect these.

P. H. B.

**VON JAGIĆ (N.). Ueber das Verhalten der Körpertemperatur bei Dysenterierekonvaleszenten.** [Temperature Records in Dysentery Convalescents.]—*Wien. Klin. Woch.* 1915. Mar. 18. Vol. 28. No. 11. p. 299.

The author made accurate temperature records in a series of convalescent cases of bacillary dysentery. These convalescents had been returned to hospital owing to general weakness, although the stools were quite normal. The last diarrhoeal stools had been passed fourteen days to four weeks previously. In spite of the normal character of the stools and the absence of any complications, the body temperature (axillary) showed a slight elevation ( $37^{\circ}$ – $37.8^{\circ}$  C.), which lasted from six days to three weeks. This rise of temperature appeared daily during the afternoon hours or occasionally every third or fourth day and had no relation to exercise or rest. It was also independent of the treatment employed during the dysentery period. The author suggests as a possible cause of the temperature, the ulcerative intestinal lesions which have been demonstrated by the rectoscope in such cases while the stools appeared normal. He notes also that the symptom may be helpful from the sanitary point of view as pointing to a past dysentery in the field.

J. C. G. L.

**KLIMA (C.). Hefe-Präparat Jaroschka-Richter bei Ruhrerkrankungen versuchswise angewendet.** [The Yeast Preparation Jaroschka-Richter in its Experimental Application to Dysenteric Infections.] *Prager Med. Woch.* 1914. Nov. 12. Vol. 39. No. 46. p. 560.

The author gives his experience with a new yeast preparation, as a

medicament in bacillary dysentery. It had been previously used in the treatment of diarrhoea in calves, as an astringent. It was said to be quite free from toxic substances. The dose employed in the cases of bacillary dysentery was 3-4 teaspoonfuls daily. Even after the first dose definite improvement set in and the stools became firmer. Only a few patients were unable to tolerate the powder. After improvement set in half a teaspoonful was given 2-3 times a day, shaken up with water, milk or tea.

A chemical analysis of the substance is supplied.

J. C. G. L.

**REMLINGER (P.) & DUMAS (J.).** *Sur une épidémie de dysenterie bacillaire, observée dans l'Argonne.*—*C. R. Soc. Biol.* 1915. May 28. Vol. 78. No. 9. pp. 254-257.

In December, 1914 the authors were commissioned to proceed to Sainte-Menehould in the Argonne to investigate an epidemic supposed to be dysentery. They remained at this spot from 25th December to 15th February 1915 and at Condé-en-Barrois from 16th February, to 22nd March, during which time they examined several hundred patients. Points of clinical interest were the small number of motions, the absence of complications, the natural tendency to cure and the inefficacy either of anti-Shiga serum or of polyvalent anti-Shiga-Flexner-Y serum. They studied 25 strains isolated from the excreta; 23 of these agreed in all respects with Bac. Y of HISS and RUSSELL. They did not ferment maltose, produced little or no indol and were agglutinated by a "Y" serum in dilutions varying from 1 in 500 to 1 in 4,000. The sera of the patients attacked gave feeble agglutination at the commencement of the disease but the titre rose to 1 in 50-1 in 100 towards the 12th or 15th day and reached its maximum at convalescence. They also note that the Argonne "Y" bacillus was agglutinated by normal healthy individuals only in 1 in 10 dilution, 1 in 25 being exceptional. [Technique and observation period not stated.]

From the 10th to 15th day it was also possible to demonstrate complement-binding bodies in the patients' sera. During this same epidemic, two grave cases were found to be infected by B. Shiga.

J. C. G. L.

**DOPTER (Ch.).** *La Dysenterie bacillaire dans les Armées en Campagne.*—*Paris Méd.* 1915. Apr. 24. No. 51. pp. 510-512.

Brief historical survey of bacillary dysentery as a disease which constantly follows armies in the field. All the great struggles of the 17th, 18th and 19th centuries were marked by its epidemic development in degrees surpassing that of other infections. For example, in the war of 1870 there were in the German army 38,652 cases with 2,000 deaths. In the Russo-Turkish war there were 41,300 cases and in the Boer war (according to BIRT) one-sixth of the deaths were due to bacillary dysentery. In the last Balkan war, though no exact figures are available, bacillary dysentery was frequent in Turkey, Bulgaria

and Serbia. As a rule, in times of peace dysentery has a marked seasonal prevalence, commencing at the end of June or beginning of July, attaining a maximum in August, and declining towards the end of September. In war, however, it does not tend to disappear in the winter. Owing to constant change of occupiers, cantonments and camps already contaminated become vast pandemic foci where dysentery rages without interruption. Factors predisposing soldiers to specific infection by *B. dysenteriae* are lack of warm clothing, bivouacking on moist soil, prolonged sojourn in wet trenches, unsuitable food, the drinking of impure brackish water and acute or chronic exhaustion, etc. In any rational prophylaxis against the disease, these predisposing factors must be combated.

J. C. G. L.

**VON JAKSCH (R.). Ueber Ruhr (Dysenterie).—Prager Med. Woch. 1914. Vol. 39. No. 41. pp. 513–515.**

General paper dealing with the aetiology, pathology, diagnosis, prophylaxis and treatment of bacillary dysentery. A large proportion of the cases observed by him were Shiga infections but they were not of severe type and only one patient died. [The total number of cases is not given.] With regard to therapy the author commences with castor oil and does not approve of calomel. Bolus alba is recommended in doses of 10–100 gm. in 200–300 cc. of water daily. Opium is prescribed for sleeplessness and, if tenesmus is severe, subcutaneous injections of morphine and enemas of tannin are given. Animal charcoal was also useful. Intravenous inoculation of saline fluid (15 gm. Na Cl, 0.45 gm. Ca Cl<sub>2</sub>, 0.7 gm. K Cl in 1,000 cc. water) proved of the highest value in the very severe cases.

Specific therapy with antidysentery serum he had no experience of, as the cases were not severe enough to call for its employment.

J. C. G. L.

**SINGER (Gustav). Ueber dysenterische Rheumatoide. [On Dysenteric Rheumatoid Conditions].—Wien. Med. Woch. 1915. Feb. 6. Vol. 65. No. 6. pp. 318–322. With 3 text figs.**

The author gives a brief review of the literature of joint affection as a complication of bacillary dysentery. His belief is that the ulcerative processes in the bowel offer opportunities for invasion of the organism by secondary bacteria, particularly pus forming bacteria, which latter reach the joints and cause the rheumatoid changes.

In the course of an experience with 600 dysentery cases (Vienna) the author noted seven complicated by polyarthritis. One very severe case is recorded in detail. The patient was admitted on September 25th, 1914 suffering from dysentery with passage of blood and mucus and painful swellings in the region of the knee joints. Puncture fluid from joint was slightly cloudy but sterile (twice examined). On October 1st the metacarpophalangeal joint of the right middle finger was swollen and the skin over it reddened. On October 18th a bullous erythema appeared over the knee and wrist joints. On October 21st a similar efflorescence appeared on the front of the thorax. Strépto cocci were isolated from blood taken from the arm vein and from the

skin pustules. Staphylococci and streptococci were recovered. The patient's serum agglutinated B. Shiga completely in 1 in 50 and incompletely in 1 in 100. From October 24th electrargol was given intravenously in 5 cc. doses increasing to 15 cc. daily. On October 31st a fresh eruption appeared over the parotid region. Polyvalent antistreptococcal serum was given on 7th, 8th and 10th November in doses of 50 cc., 50 cc., and 100 cc. subcutaneously. After December 28th the temperature remained normal. Some thickening of the joints remained, but absolutely normal function returned.

J. C. G. L.

WEINBERGER (M.). **Verhütung und Behandlung der infektiösen (Bazillen-) Dysenterie.** [Prevention and Treatment of Bacillary Dysentery.]—*Wien. Med. Woch.* 1914. Nov. 21. Vol. 64. No. 47. pp. 2396–2401; Nov. 28. No. 48. p. 2428.

General paper dealing with bacillary dysentery in all its aspects and not suitable for condensed review. In discussing treatment the author expresses strong faith in the value of calomel though it is contraindicated when albuminuria is present. In such cases castor oil is to be preferred. Practically the whole gamut of pharmacopoeal drugs useful in the treatment of diarrhoea generally, heart weakness, tenesmus, sleeplessness, etc. are referred to without any particular guiding lines and the reader is left to take his choice. Bolus alba (as recommended by STUMPF in cholera) and animal charcoal receive favourable mention. They may be given together with advantage. The use of hypertonic saline solutions (following ROGERS in cholera) is also recommended. In chronic dysentery, indolent ulcers in the lower bowel may be demonstrated by the rectoscope and touched with 2 per cent. silver nitrate (as recommended by LENTZ and KANTOROWICZ). Dysentery serum may also be given in enema along with eucalyptol.

J. C. G. L.

SINGER (Gustav). **Erfahrungen aus der letzten Dysenterieepidemie.** [Experiences from the last Dysentery Epidemic.]—*München. Med. Woch.* 1915. Feb. 9. Vol. 62. No. 6. pp. 183–184.

¶ The present communication supplements a previous paper (*Medizinische Klinik*, 1914, No. 44) and concerns itself with an outbreak of dysentery in the Schwarzenberg barracks. In the previous paper the author insisted upon the value of rectoscopic examination; this he reiterates in the present one. More particularly is this method of value during convalescence after the acute attack. Often at this stage bacteriological examination of the stools is quite untrustworthy; nevertheless the author commonly found, especially in upper tracts of the large gut, bleeding ulcerations of varying intensity at such a time as the patient was eating normal food. This apparent contradiction between the local lesion and the patient's well-being is of such frequent occurrence that the author is inclined to rely more upon the rectoscopic inspection than on the general appearances in discharging a patient from hospital. Several observations on the

blood in dysentery are recorded. Generally there is an increase of the erythrocytes up to 6,000,000, of the haemoglobin to 120 per cent. and a leucocytosis of 30,000; of the white corpuscles the lymphocytes and large mononuclears are relatively increased. Convalescence was often complicated by a peculiarly obstinate constipation, generally accompanied by bradycardia and a moderate pyrexia. A relapse occurred but once.

Of complications the following are included:—Myalgias especially of the deltoid and trapezii, intercostal neuralgias, conjunctivitis, urethritis and arthritis of the knee joint, which latter occurred in seven cases. Of the therapeutic measures employed the following are especially noted: rectal injections of saline and adrenalin solution in haemorrhagic cases. The value of antidysenteric serum was attested by the general improvement of the patient's well-being and the arrest of haemorrhage, but the diarrhoea is not vitally affected thereby. In one particular case an injection of normal horse serum was given with apparently beneficial results. In a series of toxic cases, in which for some reason or other the injection of antiserum was impracticable, intravenous injection of hypertonic saline was given with most favourable results and rapid disappearance of toxic symptoms. This beneficial effect the author is inclined to ascribe to neutralisation of the dysenteric toxin by chemical action rather than to the production of osmosis.

P. H. B.

**SOLDIN (Max).** *Zur Behandlung der Kriegsruhr.* [Treatment of Dysentery in War.]—*Therap. Monatshefte.* 1915. Mar. Vol. 29. No. 3. pp. 145–147.

Bacillary dysentery among the soldiers has, in the writer's experience, been of a relatively benign character. In August and September last, many soldiers passed through an attack without having to leave their posts. Of the cases observed 96 per cent. were slight attacks and 1·2–1·5 per cent. were fatal while 2·5 per cent. took on a chronic character. In the severe or pernicious varieties death took place in 7–17 days and no therapy was of any avail. Generally the diarrhoea ceased about 24 hours before death. As the patients could drink well, saline infusions were not necessary. They were however prescribed but only transient improvement resulted.

The following was the treatment prescribed in slight cases:—For the first two days gruel only, with unsweetened tea or cocoa for the thirst. On the third day, a few biscuits with one or two tablespoonfuls of white cheese were prescribed. Eggs or veal in readily digestible form might be given on the sixth day and by the tenth day ordinary food could be given with safety. Soft cheese was found to be very useful. It was freshly prepared from sour milk heated to 40° C. Dietetic treatment alone sufficed to cure but occasionally bolus alba, bismuth and tannin, etc. were given without materially hastening recovery.

In chronic cases going on for perhaps three months bismuth was given in large doses. Fresh relapses were often accompanied by heart weakness for which caffein, camphor and digitalis were prescribed.

Opium and morphine were given to combat sleeplessness but only at the request of the patient. In these chronic cases meat, eggs and vegetables might be given with impunity at a time when 20 stools a day were being passed. Each patient had a warm abdominal binder.

J. C. G. L.

**RUMPEL (Th.). Die Dysenterieerkrankungen der Kriegsverwundeten im Allgemeinen Krankenhaus Barmbeck. [Dysentery-like illnesses of the Wounded in the General Hospital at Barmbeck.]—München. Med. Woch. 1915. Feb. 9. Vol. 62. No. 6. pp. 180-182.**

Cases of dysentery reported from and originating in the town of Hamburg are extremely rare, amounting from the returns of the last ten years to only 1·8 per annum. The author has never succeeded in isolating any of the dysentery organisms from diarrhoeic or other evacuations in the various hospitals of the town.

The present paper deals with dysenteric attacks which prevailed amongst 623 wounded returning from the battlefields of France between the 8th August and the 1st October, 1914. Most of the cases had borne the hardships and fatigues consequent on the famous dash on Paris. The heat, shortage of food and the drinking of polluted water gave rise in the last few days of the march to attacks of diarrhoea, which did not however unfit them for their military duties. Only eight however passed blood in their motions and only five of these were invalided on account of their intestinal symptoms; the remainder were all more or less seriously wounded.

On admission to the hospital forty had pronounced dysenteric symptoms, colic, tenesmus and meteorism; in a few arthritic and cardiac symptoms supervened.

The infection appears to have been of a very mild type as all symptoms disappeared after eight days.

Bacteriological investigation of the stools was undertaken with the most stringent aseptic precautions by Dr. GRAETZ according to the generally accepted methods, and bouillon dilutions were plated out on Endo agar. Of forty patients with dysenteric symptoms the serum of thirty-five gave a positive reaction with the Flexner bacillus and from the stools of twenty-nine of these this bacillus was isolated; nevertheless, the serum of these same patients gave a positive reaction with the typhoid and three times with the paratyphoid bacillus. These organisms were also present in the stools of these particular cases. At the same time seventeen wounded men of the same army were examined who had while on service suffered from diarrhoeic attacks; of these nine gave a positive agglutination reaction in a strength of 1 in 320 to 1 in 640, while in two dysentery bacilli were found in the stools.

Similar results were obtained with wounded men from Flanders, in one of whose stools typhoid bacilli were demonstrable but who at the time had had no symptoms whatever of the disease.

From the Eastern front latterly thirty-six soldiers were examined, of whom two had well marked attacks. Three of these gave a positive blood reaction towards the Flexner bacillus and one paratyphoid carrier was found.

The proportion of dysentery carriers to those actually suffering from symptoms of the disease appears to be an abnormally large one; this is not to be wondered at seeing that the illness was of a particularly mild type and thus conducive to the "carrier state."

The question how these carriers should be disposed of is a difficult one, for it was ascertained in this instance that the bacilli were retained in the intestinal canal for sixty days. It would therefore be a very serious matter from a military point of view to detain the very large number of bacilli carriers on such a widespread field of operations as obtains in the present war.

The same question appertains, but to a much more serious extent, to typhoid and paratyphoid carriers; from a military point of view these should be detained in hospital until the intestinal canal is free. In the series under discussion these were present to the extent of 4.62 per cent.

The biblical proverb is here applicable—Seek and ye will find—and therefrom it holds good that the number of bacilli carriers is proportionate to the number of investigating bacteriologists.

P. H. B.

**MARCOVICI (Eugen).** *Ein Fall von Elephantiasis nach Lymphangitis postdysenterica.* [A Case of Elephantiasis following on Lymphangitis postdysenterica.]—*Wien. Klin. Woch.* 1915. Jan. 21. Vol. 28. No. 3. p. 64. With 1 text fig.

Many complications of dysentery, such as arthritis, neuritis, etc. have been observed in the recent Austrian epidemic. Amongst the rarest of these is a disturbance of the lymphatic system such as occurred in the present case—a reservist of 36 years of age—which is illustrated by a photograph showing a well marked oedema with limitation of movement of the left leg. X ray examination of the joints was negative; the limb was extremely painful and the skin hyperalgesic. The serum strongly agglutinated dysentery bacilli two and a half months after the attack and when the swelling of the leg first became visible. The blood showed a relative anaemia with a moderate leucocytosis. The elephantoid swelling of the limb has become more and more marked after separate attacks of lymphangitis.

P. H. B.

**FLEXNER (Simon) & AMOSS (Harold L.).** *The Rapid Production of Antidysenteric Serum.*—*Jl. Experim. Med.* 1915. May 1. Vol. 21. No. 5. pp. 514–524. With 3 text figs.

The increased demand for anti-dysentery serum owing to the war led the authors to undertake an improvement in its preparation, especially with a view to reducing the time required for the immunisation of horses. Hitherto horses have been injected with cultures of soluble products of dysentery bacilli over long periods of time, the inoculations being chiefly subcutaneous. Owing to the occurrence of ulcerations, etc. leading to postponement of immunisation it frequently took 9–12 months to secure an efficient serum. The authors have applied the principle of repeated inoculation at short intervals—a method which has proved successful in obtaining potent agglutinating,



precipitating and cytolytic sera in small animals. Immunisation was begun with a three-day course of *intravenous* injections of killed bacilli belonging to the "Flexner" group. (Agar cultures grown 24 hours at 37° C. Each slope suspended in 2 cc. of 0·8 per cent. saline. First dose = 1 cc. of suspension, heated at 60° C. for 30 mins. Second dose = 5 cc. Third dose = 5 cc.). These three doses were given on three successive days. After an interval of seven days a second 3-day course of live bacilli of "Flexner" group, was given, viz. 4 loops on 1st day, 10 loops on 2nd day and 20 loops on 3rd day. After another 7-day interval a 3-day course of living "Shiga" bacilli were given alternately, the doses being chosen so as to produce a sharp febrile reaction, subsiding in 24 hours. After 10 periods of 3-day inoculations the serum was tested for agglutination titre and protective value in guinea-pigs and rabbits. Various strains of "Flexner," "Strong," "Y," and Shiga bacilli had been employed for immunisation. The antiserum obtained agglutinated Flexner strains up to 1 in 4,000, "Strong" strains up to 1 in 4,000, "Y" strains up to 1-5,000 and Shiga strains in 1 in 1,200 to 1 in 4,000. The rise in agglutinins was more pronounced for the Flexner group than for Shiga strains.

To test its protective action guinea-pigs were inoculated intraperitoneally with mixtures of living Flexner or Shiga bacilli and dilutions of the antiserum, while rabbits were inoculated intravenously with mixtures of Shiga toxin and dilutions of the antiserum. The Shiga toxin was prepared from a 3-day growth of Shiga in sugar-free broth containing calcium carbonate, the organisms being finally killed with ether and removed by filtration through hardened filter paper. The result of the tests was as follows:—Before immunisation 0·5 cc. of the normal horse serum was able to prevent death when mixed with 2 M.L. doses of Flexner bacilli or 2 M.L. doses of Shiga bacilli, but this quantity of serum did not prevent death when mixed with 4 M.L. doses of Shiga toxin.

After immunisation, 0·008 cc. of the antiserum protected against 2 M.L. doses either of Flexner or Shiga (intraperitoneal inoculation of guinea-pigs of 225 gm. weight) while 0·003 cc. protected against 4 M.L. doses of Shiga toxin (intravenous inoculation of rabbits of 1,250-1,500 gm. weight).

An efficient serum for therapeutic employment in man was thus ready after an 8-10 weeks' course of immunisation. Regular bleeding was begun at the 10th week and thereafter continued with intervening immunisation periods.

J. C. G. L.

SONNE (E.). *Beobachtungen über Klinik und Epidemiologie der giftarmen Dysenterie-bazillen-Infektion in Dänemark.* [Observations on the Clinical and Epidemiological Aspects of Bacillary Dysentery in Denmark due to the Non-Toxin producing types.] —*Zeitschr. f. Klin. Med.* 1914. Vol. 81. No. 1-2. pp. 73-112.

This is a valuable paper dealing with the clinical and epidemiological aspects of sporadic bacillary dysentery in Denmark caused by various members of the mannite fermenting group of *B. dysenteriae*. The paper also contains data concerning the presence of dysentery bacilli in the excreta of children suffering from gastro-enteritis. These latter

data are of particular interest to us in England where considerable bacteriological research has been devoted to this subject. In this review the more important data only are referred to as the paper does not lend itself to condensed reference. The purely bacteriological aspects of the work are separately published in the *Centralbl. f. Bakt.* 1. Abt. Orig. 1915. Vol. 75, p. 408.

During nineteen months, September 1911 to March 1913, 1,482 samples of faeces from various sources (typhoid, paratyphoid, dysentery, etc.) and 99 samples of urine were examined specially for *B. dysenteriae* in the Diagnosis Department of the Serum Institute at Copenhagen; 62 samples gave positive and 1,420, negative findings. Cases giving positive findings occurred at all seasons of the year, even during the winter months. They were essentially sporadic. Of the 62 positive samples, 30 came from children under six years of age in Copenhagen. These will be considered later. Of the 32 positive samples from persons over six years of age and adults, 12 contained blood with or without mucus, 12 had mucus but no blood, while 8 contained neither. With regard to the nature of the infection in these cases among adults the great majority, so far as their history could be enquired into, suffered from attacks of moderate severity; a few had severe attacks, while one adult had apparently no complaint at all. In several cases the disease ran a chronic course or tended to relapse. Accurate clinical details could not be obtained but, as a rule, the disease commenced suddenly with a feeling of malaise, slight fever, and more or less severe diarrhoea. The fever (only in one case reaching 40° C.) disappeared after a day or two and the patients as a rule got well rapidly, the blood disappearing from the stools in a few days. Occasionally the motions were thin and slimy for some time and convalescence was retarded.

Of the 1,420 negative samples, 48 came from persons who on a previous or later occasion gave positive results, 18 contained blood and sometimes mucus, 37 contained mucus without blood, while 141 came from children suffering from gastro-enteritis. The remainder of the negative samples (viz. 1,176) came from individuals who in all probability had no symptoms pointing to dysentery or diarrhoea. They were mainly suspected typhoid or dysentery carriers or persons in the entourage of such. The 99 urine samples were all negative.

With regard to the results obtained in gastro-enteritis among children examined mostly during the summer and autumn season of 1912, 27 cases out of 144 gave positive findings. Of the 27 cases 19 were under one year and eight between one and six years of age; 123 children, suffering from conditions not accompanied by diarrhoea, e.g. rickets, bronchitis, eczema, etc. gave entirely negative findings. With regard to the clinical symptoms in the positive cases, the onset was sometimes sudden with frequent slimy or thin watery motions. In 75 per cent. blood was present at some time in the motion. The disease tended to run a chronic course. Only occasionally were the patients well in 8-14 days and as a rule 1-2 months elapsed before the stool became normal and free from mucus. Ten per cent. of the cases were fatal. Of the 117 cases of gastro-enteritis which gave negative findings qua *B. dysenteriae*, clinical histories were available in 62 and of these 18 per cent. were fatal while 22 showed evidence of more or less severe intoxication, and these included most of the fatal cases.

Haematemesis occurred in six cases, whereas among the cases giving positive findings this symptom was never noted.

The author was unable to decide that on purely clinical grounds a distinction could be drawn between cases in which dysentery bacilli were demonstrated and those in which negative findings were obtained. He believed however that the presence or absence of blood in the stools offered valuable differential evidence. It was remarkable that of the 62 cases negative qua *B. dysenteriae*, only nine had blood in the stools (13 per cent.) while of the 27 cases positive qua *B. dysenteriae*, 75 per cent. presented blood stained stools. He comes to the conclusion that a bloody stool in gastro-enteritis affecting small children is present only when dysentery bacilli are present. It has to be observed that the author examined only a small proportion of the total number of such cases in the summer of 1912. 2,200 were reported in 1912 in Copenhagen. [The finding of *B. dysenteriae* in a certain proportion of cases of summer diarrhoea or rather of gastro-enteritis occurring during the summer and the presence of blood in the motions of 75 per cent. of these, are important points. The absence of *B. dysenteriae* in another group of cases which did not show bloody stools but which ran a more severe course accompanied by evidence of intoxication is equally important and strongly supports the view that there are two predominant types of summer diarrhoea—a toxic or choleraic form and a true dysenteric form. In London the former prevails in a bad season and *B. dysenteriae* has not with certainty been recovered therefrom. Morgan's Bacillus No. 1 has been most closely associated with the choleraic form (see paper by MORGAN and LEDINGHAM, Proc. Roy. Soc. Med.; Epid. Sect. 1909). It is quite possible however that some of our London cases may be genuine cases of bacillary dysentery, especially as *B. dysenteriae* (Flexner Y type) has been found to be the causative agent in at least one small dysentery outbreak amongst children. In America the two types occur, one with and the other without the presence of *B. dysenteriae* in the excreta.]

J. C. G. L.

GETTINGS (H. S.) & WALDRON (Ethel). **The Detection of a Dysentery Carrier.**—*Jl. Mental Sci.* 1914. Oct. Vol. 60. No. 251. pp. 605-608.

In a previous paper one of the authors (Gettings) had attributed the persistence of bacillary dysentery in the West Riding Asylum to carriers and chronic cases [see this *Bulletin*, Vol. 3, p. 84.] The present paper contains notes of an instructive carrier case. A female patient admitted in 1910 had passed loose stools (2-5 a day) for four years without any further symptoms. These stools never contained blood. A mannite-fermenting *B. dysenteriae* was isolated by the authors from the excreta and it appeared highly probable that the patient had entered the asylum in an already infected state and had been responsible for a succession of dysentery cases in the asylum since her admission. The authors insist on the importance of regarding seriously cases of this kind which would very probably be labelled simply as chronic diarrhoea. It is, in their opinion, imperative to watch these quiet chronic cases which do not present the ordinary appearance of dysentery and consequently go so often unrecognised. The question arose

whether one ought to isolate every patient showing persistent looseness of stools irrespective of a negative bacteriological finding. The discharge of *B. dysenteriae* is possibly intermittent in these cases and consequently it may not be possible, without repeated examination, to demonstrate the specific cause. Many of these may, however, be quite innocent.

J. C. G. L.

#### MIXED AND UNCLASSED DYSENTERY.

**HALLENBERGER.** **Die Aetiologie der Dysenterie in Südkamerun.** [The Etiology of Dysentery in South Cameroon.]—*Arch. f. Schiffss. u. Trop. Hyg.* 1914. Aug. Vol. 18. No. 16. pp. 551-564. With 1 plate.

Before the writer came to this colony in 1911 yearly reports had indicated the presence of both amoebic and bacillary types of dysentery, but the proportion in which each occurred was not clear. The general impression in 1911 was that the amoebic form occurred the more frequently, but the writer determined to investigate the question carefully and examine all cases microscopically and bacteriologically. In all, 62 cases were examined. They occurred sporadically and the patients came both from the bush and from the coast. The sample of population therefore from which the samples came was fairly representative. Of these 62 cases, 55 proved to be bacillary, and 4 amoebic, and of the bacillary cases, 29 contracted the disease in the coast region. Endemic dysentery in Cameroon is therefore mainly bacillary. With regard to the amoebae found in these few cases, they agreed in practically every particular with Hartmann's *Amoeba tetragena*. Cysts were never observed and no case of liver abscess was met with. Fifty-eight dysentery strains were carefully examined by agglutination and fermentation methods, 23 proving to be *B. Shiga* and 35 of Flexner type (maltose fermentation in all, positive).

Certain variations occurred in some strains after passage for 18 months on artificial media. Thus six *Shiga* strains failed to give acid reaction on glucose, while two had acquired the property of fermenting maltose. Of the Flexner strains four had given acid on cane sugar when originally isolated [? *B. Strong*] while seven at the end of one year had apparently acquired the power of fermenting cane sugar. The strains isolated were also tested with the homologous sera from the patients and in nearly all cases a positive reaction was obtained, the titres varying from 1 in 100 to 1 in 2,000. The variant strains when tested with specific sera gave the same agglutination reactions as the original strains from which they were derived. The writer makes the important statement that in tropical climates it does not always hold that *B. Shiga* causes the severe forms of infection while the mannite fermenting type are responsible for the slight cases. He had observed quite slight cases due to *B. Shiga* and some very severe cases due to *B. Flexner*. Both types can produce a true dysentery.

J. C. G. L.

**TESTI (Francesco).** *Sulla Dissenteria in Cyrenalca.* [On Dysentery in Libya.]—*Giorn. Med. Milit.* 1915. Jan. 31. Vol. 63. No. 1. pp. 43-48.

The author gives some interesting figures as to the prevalence of dysentery among the Italian troops during the war of 1913-1914 in Libya, as follows:—

Number of cases per mille of dysentery from July 1913 to August 1914.

1913.			1914.		
July	..	per mille 0.1	January	..	per mille 0.01
August	..	.. 6.0	February	..	.. 0.0
September	..	.. 1.0	March	..	.. 0.0
October	..	.. 0.5	April	..	.. 0.1
November	..	.. 0.09	May	..	.. 0.4
December	..	.. 0.5	June	..	.. 0.1
			July	..	.. 0.9
			August	..	.. 0.02
			September	..	.. 0.0

J. B. N.

**NOC (F.).** *Parasitisme intestinal en Cochinchine. Contribution à l'étude des dysenteries indo-chinoises.*—*Bull. Soc. Path. Exot.* 1915. Apr. Vol. 8. No. 4. pp. 208-217.

The earlier portion of this paper is devoted to a criticism of certain views put forward by BRAU [see this *Bulletin*, Vol. 2, p. 189], who attempted to re-establish intestinal anguillulosis (strongyloidosis) as a causative factor in the chronic diarrhoeas of Cochin-China. According to Brau's observations, these parasitic infections were accompanied by a high degree of eosinophilia which was of diagnostic significance even in the absence of larvae from the stools. Noc proceeds to discuss the general question whether these intestinal helminths are pathogenic or not in the dysenteries and diarrhoeas of Cochin-China and at the close of a review of the chief writings on this subject comes to the conclusion that, in spite of the interest attaching to the observations of TEISSIER, ASKANAZY, DARLING and YOKOKAWA, according to whom the *Anguillula* and its larva are capable of causing a leucocytic infiltration of the intestinal tissues, the characters of this reaction and the troubles which may ensue therefrom do not so far justify us in defining precisely the intestinal symptoms for which this intestinal parasite is responsible. In Cochin-China, where malaria, amoebic or bacillary dysentery, strongyloidosis, etc. prevail (sometimes in the same individual) experimental study of this question is difficult.

In default, the writer believes that it would be of interest to compare notes on some cases of intestinal trouble in the course of which anguillulae appeared. In 1914, only four such cases had been observed in the course of an examination of nearly 400 cases of dysentery or diarrhoea, either by his predecessor BRAU or by himself. In these four cases there was always some other factor, either amoebic or *B. dysenteriae*. Notes of the cases are detailed, three being amoebic and one chronic bacillary (Type Flexner) with amoebae as well. In spite of the presence of helminths each of these cases pursued the course characteristic of amoebic or bacillary

dysentery. The case in which B. Flexner was present in addition to amoebae, came to autopsy and a histological study was made of the large intestine, the mucosa of which was congested and beset with numerous ulcers containing pus, some being superficial and others deep. Amoebae were not found in the pus from these ulcers. Histologically, amoebae were scarce in the superficial zone of the mucosa and there were no amoebae or anguillulae in the various layers of the intestinal wall. Numerous larvae of anguillula were found in material from the duodenum, becoming less numerous lower down but they could be detected even in the appendix. In the presumed neighbourhood of the adult anguillulae (their exact site in the duodenum was not ascertained) no pathological change in the glands was detected and the blood vessels showed only a slight degree of sclerosis. There was no local intestinal eosinophilia. The lesions found post-mortem were essentially those of chronic bacillary dysentery. The amoebae and possibly also the anguillulae appeared to have played only an irritative rôle and certainly a secondary one in face of lesions observed frequently in dysenteries due to B. Flexner.

In the discussion of this paper, LAVERAN expressed the view that anguillulae, especially if numerous, cannot be considered entirely innocuous, and that patients who harbour these helminths do well to get rid of them. In persons heavily infected with them, they undoubtedly irritate the mucosa of the intestine and perhaps also, harm is done by absorption of the toxins elaborated by them.

J. C. G. L.

PEISER (H.). *Störungen der inneren Sekretion bei Ruhr.* [Disturbances of the Internal Secretions in Dysentery.]—*Deut. Med. Woch.* 1915. Jan. 14. Vol. 41. No. 3. pp. 65-66.

Proptosis and exophthalmos were observed in dysenteric cases; and subsequently signs of such disturbance, other than thyroidismus, became observable in 10 per cent. of all dysenteries and in one case an enlargement of the thymus ascertainable by percussion.

In some cases the thyroid gland was distinctly palpable. In others a fine tremor of the eyelids, hands or tongue was ascertainable. In nearly all cases vasomotor changes were present and dermatography could be demonstrated. Disturbances of the pancreatic secretion and function could be substantiated by the help of Loewisch's reaction.

The slight pyrexias and alterations in pulse rate so often observed during convalescence can be ascribed to these changes.

Renal secretion was disturbed and curtailed in some instances to less than one half. The most important disturbances are those of carbohydrate metabolism. The carbohydrate tolerance, especially after the subcutaneous administration of small doses of adrenalin, was markedly diminished. It is questionable whether this result is not due to irritation of the vago-sympathetic and through it to a dominance of the thyroid suprarenal group over the pancreatic-parathyroid group of glands. The author considers the therapeutic measures to be adopted; of these belladonna preparations especially have an effect on the vagus. The effect of this drug was especially noted in allaying the symptoms of spasmodic contraction of the small intestine.

P. H. B.

SALOMON (H.). *Pathologie und Therapie der Ruhr.* [Pathology and Therapy of Dysentery.]—*Wien. Klin. Woch.* 1915. Jan. 7. Vol. 28. No. 1. pp. 5-7.

This communication consists of a text-book lecture on dysentery. Some attention is paid to prophylactic inoculation of bacillary dysentery from which the Japanese have had some good results. Considerable attention is paid to the treatment and the therapeutic role of such drugs as simaruba and uzara is considered.

The lecture, which contains no original matter, is written as a ready aid to the profession during the war.

P. H. B.

QUINCKE (H.). *Ueber die Wandlungen des Ruhrbegriffs.*—*Med. Klin.* 1914. Nov. Vol. 10. No. 46. Pt. 2. pp. 1679-1681.

A brief paper containing a summary of the various etiological factors of dysentery considered as a clinical entity, the author being of opinion that, in addition to the well known causes such as amoebic infection and infection with *B. dysenteriae* (Shiga, Flexner, Y and Strong) many other causes may give rise to similar symptoms. Dysentery is, in the author's view, a clinical term only, and the clinical picture may be induced by microbes other than *B. dysenteriae* and by various chemical or mechanical injuries of the intestine. Such injuries may be induced by coprostasis, cold, the eating of half ripe fruit or raw vegetables and veritable epidemics may arise among troops from these causes. He admits however that corresponding to the different etiologies there may be certain differences in the clinical picture and in the course of the malady. It is not advisable to use the term dysentery (*Ruhr*) only for cases caused by dysentery bacilli because in many cases the demonstration of the bacilli in the stools cannot always be made. At the same time, every dysentery patient or suspected dysentery patient should be treated as if he was infectious, while bearing in mind that not every patient suffering from clinical "dysentery" is necessarily infectious. The author informs us that infections by Shiga, Flexner and Y bacilli occur among the troops and that "Y" infections are the most frequent. Bacteriological examinations of the stools should be carried out whenever possible, in order to establish the fact of specific infection with *B. dysenteriae*.

J. C. G. L.

LESCHKE (E.). *Ueber ruhrähnliche Darmerkrankungen.* [On Intestinal Affections simulating Dysentery.]—*Deut. Med. Woch.* 1914. Dec. 3. Vol. 40. No. 49. pp. 2028-2029.

The author informs us that dysentery is one of the most frequent diseases in this war especially among the troops (German) fighting on the eastern frontier. It is apparently the practice of field physicians to give a diagnosis of bacillary dysentery in all cases of intestinal trouble accompanied by the passage of blood and mucus. Bacteriological results would, in the author's opinion, support this diagnosis in the majority of cases but it is important to remember that cases

clinically indistinguishable from bacillary dysentery and accompanied by the passage of bloody mucous stools, may have an entirely different etiological basis. In support of his contention, he gives notes of eight cases among invalided soldiers. These had been sent home for treatment to Berlin owing to their having contracted "dysentery" at the front. In spite of the fact that frequent stools accompanied by blood and mucus appeared in the recent clinical histories of these cases bacteriological examination of the excreta in Berlin did not reveal dysentery organisms and agglutination results were negative with the patients' sera. On arrival in Berlin, blood had generally disappeared from the stools, though mucus might persist. Such cases cleared up very quickly, in fact, in a few days so that it was possible to return for service.

The author believes that diarrhoeal conditions accompanied by passage of blood and mucus may be due to a variety of causes, e.g. the consumption of unsuitable food, injury of the intestinal wall by the passage of coarse indigestible food, infections proceeding from the tonsils or upper respiratory tract following colds, etc. It was remarkable in this latter connection that all his patients presented the lymphatic constitution in a more or less marked form. The treatment included rest in bed, fluid diet, poultices to the abdomen and the oral administration of blood charcoal (15-25 gm. daily at hourly intervals) which proved more satisfactory than *bolus alba* in its presumed rôle of toxin-absorber. [That cases of the kind here described, with passage of blood and mucus, can occur apart from infection by dysentery bacilli is an important fact to remember but every attempt should be made to establish the absence of *B. dysenteriae*. A single negative finding in the excreta is not sufficient.]

J. C. G. L.

McCOMBIE (F. C.). **Dysentery. Its Case Mortality in Relation to Treatment with Special Reference to Emetine, with the Object of elucidating on purely Clinical Grounds, the Incidence of Amoebic Dysentery on tea Gardens.**—*Indian Med. Gaz.* 1915. Jan. Vol. 50. No. 1. pp. 11-15.

This paper contains figures dealing with the case-mortality from "Dysentery" as it is met with in certain Assam tea gardens and from the results obtained by treatment with emetine, an attempt is made to ascertain the prevalence of the amoebic form. The data concerning the hospital cases may be adduced. Of 226 hospital cases, 24 were secondary cases with a death-rate of 87.5 per cent. The case-mortality in the primary acute cases was 26.5 per cent. and in the primary chronic cases 80 per cent. "Pure" treatments were unfortunately not employed, but of the total, 87 had emetine at some time during the treatment, with a death-rate of 66.6 per cent. In 43 the treatment was begun with ipecac or emetine with the result that 15 or 34.8 per cent. of these were cured, the inference being that only about 30 per cent. of the "Dysentery" cases were of amoebic origin. The author concludes that the treatment of dysentery in tea-gardens is unsatisfactory and enters a plea for the bacteriological investigation of cases with a view to more accurate diagnosis.

J. C. G. L.



**AXTER-HABERFELD (Relli). Ueber einen Fall von Emetinbehandlung bei Balantidiose.** [A Case of Emetin Treatment in Balantidiasis.]  
—*München. Med. Woch.* 1915. Feb. 2. Vol. 62. No. 5. p. 152.

The author, writing from Bello Horizonte, Brazil, describes his treatment of a case of Balantidian dysentery. The patient was a woman, aged 60, who had been ill four months with severe diarrhoea. Many treatments, including Uzara, had been tried without effect. The patient passed about twelve fluid stools daily, sometimes containing albumin and large quantities of blood. Numerous *Balantidium coli* were found in the faeces. Emetin was tried, 0.03 gm. being injected subcutaneously on eight successive days. The stools decreased to one per day after the first dose of emetin. After the third injection, all forms of the *Balantidium* disappeared. A slight eczema-like rash appeared at the sites of injection, but soon disappeared under treatment with ointment.

Balantidian dysentery is rare in the neighbourhood, and emetin having proved efficacious in this case, it is hoped that it may be of service elsewhere.

H. B. F.

## BOOK REVIEWS.

PHILLIPS (Llewellyn Powell), [M.A., M.D., B.C. (Cantab.), F.R.C.P. (Lond.), F.R.C.S. (England)]. *Amoebiasis and the Dysenteries.*—xi + 147 pp. 1915. London: H. K. Lewis. [Price 6s. 6d. net.]

The author begins by giving due credit to many workers who have elucidated the various problems of the dysenteries during late years. He tells us that emetin has no effect at all on the encysted form of *Entamoeba histolytica*, which seems rather too sweeping an assertion, for other observers find that cysts disappear from human faeces after prolonged treatment of the patient with intramuscular injections of emetin, though some cases may require a supplementary treatment with small doses of ipecacuanha orally. But in another chapter we are told that emetin is probably more efficient in amoebiasis than quinine is in malaria.

We are reminded that latent symptoms of appendicitis, occurring after amoebic dysentery, should have the benefit of a course of emetin before the case is handed over to the surgeon for operation, but the author still recognizes that surgical interference, appendicostomy or caecostomy, may be necessary in some bad cases of amoebic dysentery. In an excellent chapter upon treatment he recommends that emetin should be injected into the muscles of the forearm in half grain doses night and morning for ten days and then again in interrupted courses of a week for several weeks. When ipecacuanha has to be given instead of emetin, he gives ten grains of tannin with thirty grains of ipecacuanha to prevent vomiting and finds that opium is not then necessary. For liver abscess, he is of opinion that the best operation is simple aspiration, followed by emetin intra-muscularly, but not by injections of quinine into the abscess cavity. Balantidia may be expelled by thymol in large doses, while some cases of flagellate dysentery will yield to the treatment recommended for amoebic dysentery.

A very good chapter is provided on bilharzial disease of the intestines, which so often requires laparotomy or removal of polypoid growths in the neighbourhood of the sphincter. In the next edition of this useful little book, the author will have an opportunity of discarding the German name of the disease—bilharziosis—for the English bilharziasis. Polyvalent serum injections, 20 cc. for adult or child, 10 cc. for an infant, are warmly praised for bacillary dysentery, and the author has seen apparently moribund children recover under its use. He praises the serum issued by the Lister Institute, and also that used in larger doses at the Quarantine Camp at El Tor.

The book contains an adequate bibliography, but the author begins and ends by gratefully acknowledging the help which we all find from the Bulletins issued by the Tropical Diseases Bureau.

F. M. Sandwith.

STIRR (E. R.), [A.B., Ph.G., M.D.]. *The Diagnostics and Treatment of Tropical Diseases.* xi + 421 pp. With 86 illustrations. 1915. London: H. K. Lewis. [Price 8s. net.]

This handy manual, a companion volume to the author's well-known "Practical Bacteriology, Blood Work and Animal Parasitology," will be heartily welcomed. It is a distinct addition to the literature of tropical diseases. In 413 pages the author has contrived to condense a very large amount of information, a considerable portion of which is hardly contained in volumes of much larger dimensions. The very latest information on the subject is included; for instance, there is quite a full account of STRONG's work on Oroya fever. The first part of the book deals with a description of tropical diseases and their treatment; the second with the

various methods of diagnosis employed, such as blood and stool examination. The pages are interspersed with numerous charts and tables which students of tropical medicine will find very useful. Thus on p. 116 there is a full and practical table of the reactions of bacilli of tropical interest. The more important diseases—malaria, blackwater fever, trypanosomiasis etc.—are treated in considerable detail. Indeed it is difficult to criticise the book. There are no discrepancies and the information is singularly accurate. The reviewer has been able to find but one mistake and that obviously a printer's error in the spelling of LAVERAN on p. 72. The small outline illustrations of fleas, flies and helminths are in some cases a trifle crude, but are in the main accurate.

P. H. Bahr.

## TROPICAL DISEASES BUREAU.

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## MALARIA.

STOTT (H.). *Studies in Malaria*.—*Indian Med. Gaz.* 1914. Dec. Vol. 49. No. 12. pp. 462-471. With 7 charts, 2 plans & 12 photos; 1915. Jan. Vol. 50. No. 1. pp. 7-10. With 7 charts; Feb. No. 2. pp. 47-52. With 14 charts; Mar. No. 3. pp. 85-91. With 1 plate; Apr. No. 4. pp. 131-135. With 2 plates & 1 fig.; May. No. 5. pp. 172-175; June. No. 6. pp. 213-217. With 6 charts.

This lengthy and elaborate paper runs through no less than seven numbers of the *Indian Medical Gazette*, is very well illustrated so far as photographs are concerned and is furnished with plans, diagrams and records of temperature charts. It must be read in the original if its full value is to be obtained, but certain of the observations and conclusions may be noted here. The author deals with malaria at Fort Dufferin, Mandalay, as it affected five distinct population groups living within the walls, and explains why the admission rates amongst these groups varied from 68 per cent. to 1 per cent.

A brief review of the past history of malaria in Mandalay shows that there were recurring epidemic periods at somewhat regular ten-yearly intervals, and that while the curves for British and Indian troops follow a very similar general outline, the former suffered most during epidemics and the latter maintained their degree of infection to some extent throughout non-epidemic years. Stott considers the possible causes of these conditions, but is unable to advance any very definite opinion.

Turning to the epidemic under consideration, that of 1911-12, the five population groups consisted of the 91st Punjabis, the 92nd Punjabis, Jail Prisoners, Jail Warders and Europeans, all collected together in an area of  $1\frac{1}{2}$  square miles [see Plan I] and exposed to the same climatic and other external influences, yet presenting the greatest diversity as regards their rates of fever admissions, as is evident from the subjoined tables.

TABLE I.—1911.

Group.	Description.	Average monthly strength.	Total annual fever admissions.	Per cent.
I.	92nd Punjabis	681	127	18·6
II.	91st „	777	459	59·0
III.	Jail Prisoners	969	14	1·4
IV.	Jail Warders	50	31	62·0
V.	Europeans	58	16	27·5
	Troops* outside Fort	621	194	31·2

\*British, Burmese Sappers, Indian Mule Corps.

TABLE II.—1912.

Group.	Description.	Average monthly strength.	Total annual fever admissions.	Per cent.
I.	92nd Punjabis	675	187	27·7
II.	91st „	654	451	68·9
III.	Jail Prisoners	1,085	15	1·3
IV.	Jail Warders	60	18	30·0
V.	Europeans	40	9	22·5
	Troops outside Fort	543	147	27·0

TABLE III.—1913.

Group.	Description.	Average monthly strength.	Total annual fever admissions.	Per cent.
I.	92nd Punjabis	702	49	6·9
II.	91st „	645	136	21·0
III.	Jail Prisoners	974	28	2·8
IV.	Jail Warders	50	8	16·0
V.	Europeans	..	..	..
	Troops outside Fort	462	143	30·9

The author suggests three explanations of these figures :—

(i). The various groups might not be equally exposed to attacks of anophelines.

(ii). Their antimalarial immunity might vary.

(iii). They might be differently protected by the antimalarial measures adopted.

In discussing these he considers the physical and meteorological conditions of Mandalay, pointing out that not only is it a very favourable spot for the evolution of mosquito life, but that the mean temperature for each day of the year is practically that which is said to be most favourable for the life cycle of the malarial parasite in anophelines. The mosquito breeding places are described and very well illustrated. In July *M. culicifacies* and *N. rossii* were the chief breeders. [Stott speaks of the latter as harmless, but the recent work of WALKER and BARBER in the Philippines [see this *Bulletin*, Vol. 5, p. 337] goes to show that this is not quite the case, at least in the area where they worked.] In December *N. fuliginosus*, *M. sinensis* and *M. barbirostris* only were found. Although it is not possible to summarise all the information supplied, the author's deductions may be quoted. He says :-

"1. It is evident from the foregoing epidemiological account, that the physical, geological, and meteorological features of Mandalay are very favourable the whole year round to the development of mosquito life, provided that suitable breeding spots are available.

"2. We have seen that in Fort Dufferin such breeding spots are omnipresent, both in the moat which surrounds it and in the channels which traverse it. In addition there exist the surface waterpools after the rains and also those collections of water associated with the every-day life of the population.

"3. It is clear that these breeding places are taken full advantage of by the malaria carrying anophelines and that their larvae may be caught throughout the year (March and April), and that no area within the Fort can be considered out of range of flight of the adults."

He therefore thinks that there is no epidemiological explanation for the variation in the malarial admission rates. His argument can be better followed by a study of the plan.

As regards possible acquired or natural immunity, at all times a difficult question, Stott thinks that while it may have played some part a more important factor must be looked for than the mere susceptibility to infection of the groups concerned.

He considers in detail the measures adopted by the different groups, and it is interesting to note that, in the case of the jail prisoners, a wall 16 feet in height apparently wholly prevented mosquito invasion from without. He considers the following deductions justifiable :--

"1. Within a definitely confined area of one and a quarter miles square, the total abolition of mosquito breeding grounds in one small area and the prevention of mosquito immigration thereto, entirely protected one population group (the prisoners) from fresh malarial infection.

"2. Amongst the two groups (91st Punjabis and jail warders) who relied during 1911 on supervised prophylactic quinine, considerably over half (60 per cent.) were admitted with malarial fever.

"3. Whilst another group (92nd Punjabis) which took supervised prophylactic quinine, but in addition thereto relied on a supervised system of mosquito net prophylaxis, reduced this admission rate by over two-thirds to 18 per cent.

"4. Anti-larval measures against the responsible breeding grounds in the Fort caused a reduction of the 92nd Punjabis rate in 1913 to 7 per cent. and that of the jail warders to 16 per cent. Along with these measures the adoption of a supervised system of mosquito net prophylaxis in the 91st Punjabis reduced their rate by nearly two-thirds to 21 per cent.

"5. The admission rate amongst the troops and followers outside the Fort, amongst whom no special campaign was conducted, remained approximately constant for the three years at 30 per cent. per annum.

"6. Amongst the European population attempts at personal prophylaxis were so irregular as to render them from the collective standpoint worthless. The following important conclusions may be deduced from these figures of three years antimalarial prophylaxis in Mandalay—namely, that the abolition of mosquito breeding grounds with a prevention of mosquito immigration, or prophylaxis by mosquito nets and anti-larval measures proved a far better mode of preventing malarial fever than the exhibition of a carefully supervised issue of prophylactic quinine."

Part II of the paper is concerned with the experiment which was made to test the value of quinine prophylaxis, the salt employed being the sulphate given in acid solution and in 15 grain doses every Sunday, Tuesday and Thursday to the odd halves of Companies of the 91st Punjabis, the even halves being taken as controls. The men of this regiment were not using mosquito nets like those of the 92nd Punjabis and despite the quinine prophylaxis their admission rate rose after an initial fall and was at all times higher than that of the 92nd.

The original paper must be consulted for the details of the experiment, but it may be said that it was very thorough, even to the extent of testing the stock quinine mixture with the hydrometer to ensure that it possessed the proper strength of salt. As criteria for judging the results Stott relied upon (1) the fever admission rate and (2) the degree of severity of the attack.

The latter was estimated :—

"(i). *By the total number of days each patient remained sick in Hospital.*

"(ii). *By the intensity of the actual febrile disturbance, as measured by the sum of the number of degrees above 99° F., which were recorded at each reading of the patient's temperature taken four times in the 24 hours (8 a.m., noon, 4 and 8 p.m.).*

"(iii). *By the number of grains of quinine required before the pyrexia fell to normal and remained thereat until the patient's discharge.*

"(iv). *By the tendency to relapse.*"

The results under each of these headings receive careful consideration and the author concludes that :—

"After a careful consideration of the results obtained from this year's trial of supervised and controlled prophylactic quinine in the 91st Punjabis, and after due consideration has been given to the cost of the issue,\* the trouble to the medical and military authorities and the dislike of the sepoys to it, I hold that no case has been made out in the circumstances of this experiment for the use of prophylactic quinine in the prevention of a malarial attack, or in a diminution of its severity should an attack arise.

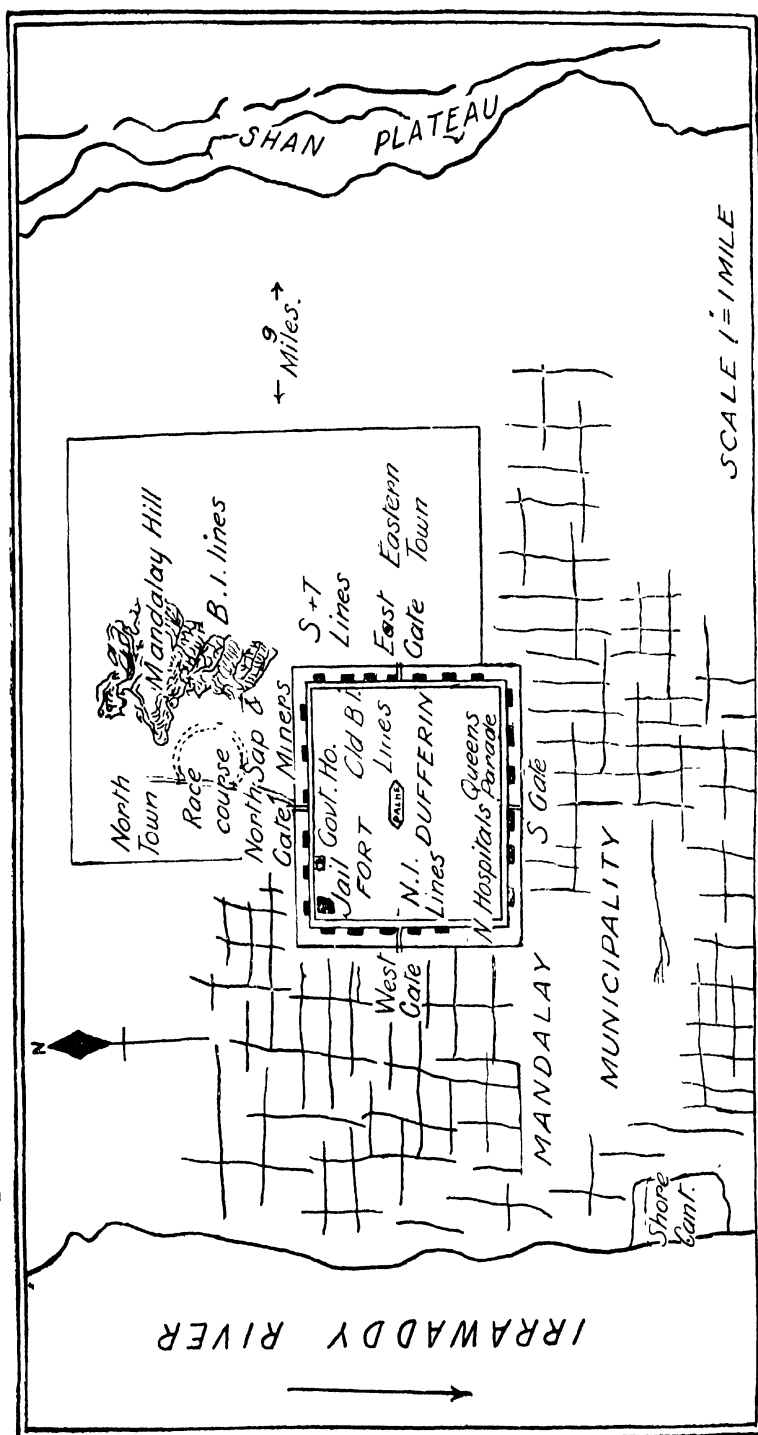
"If prophylactic quinine failed when its issue was as carefully administered as is ordinarily possible in a regiment, can it be expected to succeed when distributed broadcast amongst an undisciplined rural population ?

"No definite scientific result can be claimed as a result of this trial, for every detail could not be supervised with the necessary essential accuracy. On the other hand, a definite enquiry by special malariologists appointed to examine the controlled effect of prophylactic quinine in a regiment free from infection and posted to a malarious district, would seem to be more than ever an urgent necessity."

[It is instructive to compare this view with that taken recently by BARLOW in Honduras. [See this *Bulletin*, Vol. 5, p. 345.]

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\* The annual cost of giving prophylactic quinine for 9 months out of a year in ten grain doses twice weekly to a regiment with an average monthly present strength of 650 men is Rs.  $\frac{650 \times 20 \times 52 \times 9 \times 10}{12 \times 7,000}$  = Rs. 725.



Plan of Mandalay Cantonment, showing its relation to the Municipality.



Part III is devoted to certain clinical observations, the author insisting that the first practical line of diagnosis depends on clinical observations and, while not underrating the value of blood examination in malaria, apparently relegating it to a secondary or at least a supplementary position.

He presents a very interesting study of temperature charts, some of which are here reproduced as likely to be useful, for records of this type are not always to be found in the text books. His analysis of the various groups deserves careful study but is too extensive and minute to be summarised here. Only 5 per cent. of his cases were classed as remittents.

A portion of the paper deals with the pernicious symptoms observed and examples are given of hyperpyrexial, comatose, delirious, convulsive, parietic, dysenteric, haemorrhagic and syncopal types. The haemorrhagic case, in which there was epistaxis and blood passed from the rectum, recovered.

The remainder is concerned with blood observations, chiefly in connection with the differential leucocyte count and with notes on technique, staining and defects met with in blood films.

It is interesting to note the results obtained in the examination of films from 25 healthy adult Indian males, who were as nearly as possible of the same race and individual types as the malarial patients examined (163 in number).

The latter showed an average large mononuclear count of 21.6 per cent. In the former the count varied from 5 per cent. to 16 per cent. In 92 per cent. the average was under 15. The tables given must be consulted in the original. Stott thinks the large mononuclear count with other differentials can only be of practical value in diagnosis when the blood counter and his personal equation are known. There is nothing of special note in the chapter on technique and blood examination, while the rough drawings are of little value, but there is a table on the differentiation of malarial parasites which merits attention, as it endeavours to point out the differences between the young ring stages of the three species in addition to dealing with the large forms and the gametocytes. It may be compared with a table in the second Report of the Wellcome Tropical Research Laboratories.

In yet another instalment of his paper the indefatigable Captain Stott discusses oral quinine as a temporary curative agent and as a preventive of relapses. Under the first heading he analyses 1,019 cases under his care with a view to finding out the amount of quinine that was required to reduce the temperature to normal and maintain it thereat until discharge. Excluding 190 cases which recovered without any quinine at all, he finds that the remaining 829 required on an average 6.5 ten-grain doses of the fluid drug to fulfil these requirements. This means two days' quinine treatment at the rate of ten grains thrice daily. It seems that a case suffering from repeated malarial admissions needs on an average more quinine to effect a temporary cure in his earlier than his later bouts of fever.

Stott thinks that there are still occasions when the quinine test is helpful in diagnosis, but he is perfectly certain that the axiom enunciated by Sir Leonard ROGERS [recently also supported by BATES of Panama, see this number] cannot be relied on. It is to the effect that "any fever which lasts longer than the time limits stated

(4 to 6 days) under proper dose of quinine is not malaria or at least is not purely malarial in nature. It is, however, essential to know that the drug is really being taken in adequate doses and in an assimilable form."

The author agrees with MANSON that the quinine test will sometimes fail and he gives details of an interesting clinical case [the temperature chart mentioned is not reproduced] which certainly seems to bear out this contention.

As regards the power of quinine to prevent relapses Stott's results are somewhat vitiated, as he himself mentions, by the lack of proper controls but he presents some evidence to show that a careful four months' treatment with quinine failed in great measure to prevent relapses. Some of the apparent relapses may, however, have been fresh infections.

One cannot help thinking that the last contribution of Stott to his *Studies in Malaria* is the most sensible and satisfactory of the numerous papers which have recently appeared on the vexed question of intramuscular injections of quinine in malaria.

He considers first the risk of tetanus, which he regards as negligible and as being merely an incentive to greater care in technique.

The question of local precipitation of the salt at the site of injection next engages his attention, and he points out that quinine experiments with small animals should be received with extreme caution, for the great majority of these animals are herbivorous, their blood serum is more alkaline and hence the local reaction consequent on the injection of an irritating acid solution is greater than in carnivorous man [While this argument holds good for Europeans it cannot be advanced in the case of many vegetarian natives, and it would be interesting if statistics were forthcoming as to the relative frequency of post-injection trouble in these two classes.]

Further the question of dose per body weight has to be carefully considered. Stott's remarks may be quoted. He says:—

"The amount of quinine given these small animals per gramme body weight would seem to be enormous. Semple found that 1 grain per 150 grammes of guinea-pig was an approximate minimum lethal hypodermic dose for this animal, and that the dose of an injection sufficient to produce well-marked visible effects without killing the animal was 1 grain per 350 grammes of guinea-pig. The former corresponds to a hypodermic injection of 420 grains of quinine for a man of 10 stone weight, and the latter to an injection of somewhat under 200 grains. No wonder local effects after these guinea-pig experiments were in all cases evident."

Like most other observers he is of opinion that faulty technique has a great deal to do with the formation of indurated lumps and also with the occurrence of sepsis and other troubles which have been reported from time to time.

He proceeds to advance clinical evidence taken from his 1,019 cases of malaria as to the value of the intramuscular method and furnishes some useful illustrative charts. He believes that when the method fails the failure is sometimes due to the injection being too long delayed, but admits that there are rare cases where the injection unaccountably fails. It is, he believes, of special value in cases of persistent relapse. It is worth noting that he does not think more than ten grains should ever be injected into one spot and that more than seven is undesirable. He uses the bihydrochloride.

A. Balfour.



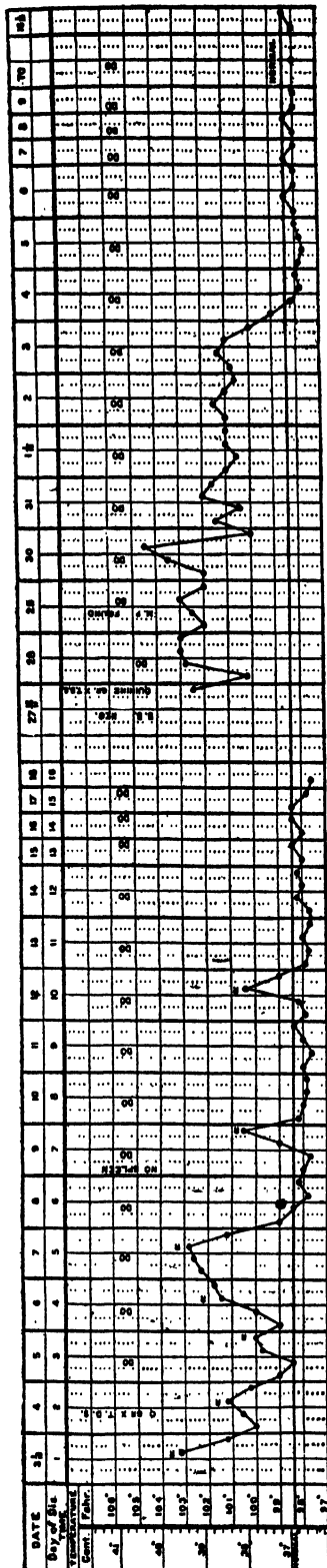


CHART X. A curve in irregular malarial infection. Sep. M.R., No. 2,838, 91st P. Aet. 20, service 2 yrs.

CHART XI. A curve in the continuous remittent fever of malarial infection. Sep. C.S., No. 1,579, 91st P.

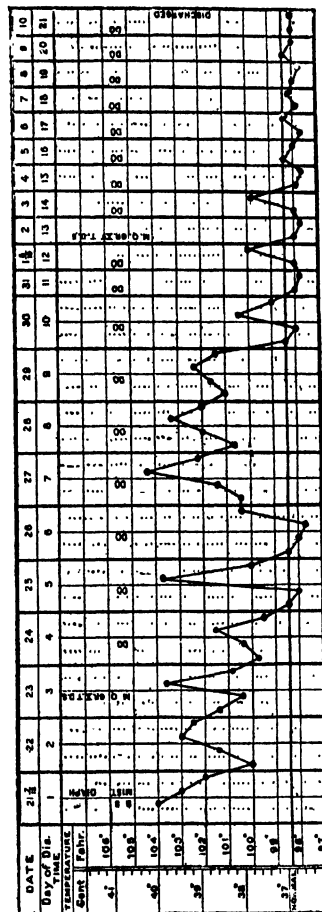


CHART XII. A curve in the subintant remittent fever of malarial infection. Sep. K.S., No. 2,714, 91st P. Aet. 22, service 4 yrs.

CHARTS SHOWING TYPES OF MALARIAL INFECTIONS.

**ALGÉRIE. Campagne Antipaludique de 1913.**—132 pp. With 2 maps, 1 plate, 6 charts and 11 figs. République française. Gouvernement Général de l'Algérie. 1914. Alger: Typographie Adolphe Jourdan, Place du Gouvernement.

This report shows that the anti-malaria campaign in Algeria proceeds apace. The two methods chiefly employed are measures against mosquitos and systematic quininisation, especially in the case of schools. The greater portion consists of sanitary records submitted by the medical officers of the districts comprising the departments of Constantine, Algiers, Oran and the Southern Territory.

The campaign, as it affects the different railway systems, receives separate treatment, and Drs. Edmond and Etienne SERGENT contribute some notes on the epidemiological aspects of malaria in Algeria. The paper on a case of pernicious malaria in which red-ringed red cells were found [see this *Bulletin*, Vol. 3, p. 50] is republished here, and the plate reproduced.

The individual reports scarcely call for special mention, though the occurrence of four cases of blackwater at Batna may be noted. Dr. MONDELIN, under whose care they were, states that one of them had never suffered from malaria. [Can cryptic malaria be excluded?] His treatment consisted chiefly in injections of artificial serum and caffeine. Three of the cases recovered. The one which terminated fatally had been treated at the outset by quinine injections.

The results of the anti-malarial measures are generally satisfactory. Quininisation is the method most easily applicable throughout Algeria, but anti-mosquito measures on a small scale have given excellent results in numerous localities. Mechanical protection against mosquitos remains a measure *de luxe* for the use of government officials and the railway staffs.

There is a good deal of useful information scattered throughout this report.

A. B.

**SERGENT (Edmond & Etienne). Etudes épidémiologiques et prophylactiques du Paludisme. Onzième et douzième campagnes en Algérie en 1912 et 1913.**—*Malariologia (Propaganda Antimalarica)*. 1915, Apr. 15. Vol. 8. No. 1-2. pp. 1-8. *Ann. Inst. Pasteur*. 1915. May. Vol. 29. No. 5. pp. 249-257.

This paper is to all intents and purposes identical with the supplement published by these authors in the Report on the Anti-malarial Campaign in Algeria during 1913 [see above.]

Some information is given regarding the breeding places of *Pyretophorus myzomyifacies*, *Anopheles maculipennis* and *Pyretophorus chaudoyei*, while the occurrence of blackwater fever at Palikao in the district of Oran as well as at Batna [see review of Algerian Report] is recorded. There is also a note to the effect that the trains traversing the marshes of Mocha in the district of Oran, or which run along the borders of the lake of Fetzara (Région de Bône), are boarded at sunset and at daybreak by swarms of anophelines which may be carried considerable distances.

A. B.

- i. CLELAND (J. B.). **Malaria in New South Wales. An Official Note from the Government Bureau of Microbiology.**—*Med. Jl. of Australia*. 1915. Apr. Vol. 1. 2nd Year. No. 14. pp. 316–317.
- ii. JAMIESON (Sydney). **Malaria in New South Wales.** (Correspondence).—*Ibid.* No. 15. pp. 346–347.

i. Cleland of the Government Bureau of Microbiology, New South Wales, commenting on the case of indigenous malarial infection recently recorded by JAMIESON [this *Bulletin*, Vol. 5, p. 342], discusses the prevalence of anophelines in New South Wales and Australia generally and deals with the risks of local infection.

His observations, together with those of FERGUSON, show that *Nyssorhynchus annulipes*, the presumed transmitter of malaria in Australia, is widely but sparsely distributed in New South Wales. It has been occasionally found in the Sydney district and even in the city suburbs, its larvae having been obtained in pools of clear, fresh water, but it is not at all common. As it has also been taken in the neighbourhood of Adelaide and Perth it would seem that it occurs throughout the Southern States, but in such small numbers as not to constitute a danger.

The only place where it is at all numerous is a spot on the River Murray in South Australia, but here there is practically no population. At the same time a mosquito survey of this river and its tributaries, such as the Darling, is required so that where an abundance of this anopheline is found malaria carriers may be excluded or properly protected.

Although a study of old records shows that malaria may have existed in certain parts of New South Wales, there is no definite proof that it did so and under present conditions there seems little likelihood of the disease spreading in this State.

ii. Dr. Jamieson replies to the above paper in a distinctly bellicose strain, being evidently under the impression that an attempt was being made to belittle the importance of his observation and warning. He considers CLELAND's statements in detail, cites the historical example of Mauritius and states that though cases of malaria not infrequently find their way into the Sydney hospitals they almost invariably belong to the seafaring class and do not settle afterwards on shore but return to their maritime life. On the other hand soldiers returning infected from New Guinea and the Solomon islands resume their former occupations to the danger of the community, thus creating a state of things hitherto unknown in New South Wales.

He reiterates his warning and calls upon the health authorities to take the steps necessary for dealing with the mosquito problem as he considers, from CLELAND's statements, that the research which has been conducted is not of a sufficiently exhaustive nature.

A. B.

BATES (John Pelham). **A Review of a Clinical Study of Malaria Fever in Panama.**—*Proc. Med. Assoc. Isthmian Canal Zone*. Oct. 1912 to Mar. 1913. Vol. 5. Pt. 2. pp. 115–136. With 3 charts.

This is an interesting paper but rather confused. Most of it could

have been compressed into much smaller compass. The conclusions which the author has reached as a result of his studies are :—

1. Malaria is a simple entity.
2. In the majority of cases it is readily amenable to treatment.
3. When it is efficiently treated the paroxysms can be controlled in from three to four days.
4. Primary infections and cases in children may prove a little stubborn but will yield on the fifth or sixth day after treatment is begun.
5. The occasional cases not affected by quinine will rapidly die.

At the outset Bates explains the method he followed in his work. It appears to have been very thorough and complete and led him to the belief that there are no long or lingering malarial fevers, nor any which may even be termed continuant.

On the other hand, there are no diseases in malarial countries which may not be complicated by malaria and there are no malaria infections which may not have some underlying disease, either patent or cryptic, to complicate their course. Hence the difficulties in diagnosis. For comparative purposes an abundance of material is essential and laboratory facilities are a *sine quâ non*. The author was fortunate in having both.

He reviews the standard text book teachings and finds that, with the exception of MARCHIAVA and BIGNAMI, OSLER to some extent, and perhaps MANSON, all the authorities regard malaria as a somewhat variable entity and protean in its manifestations. They state that it usually yields promptly to quinine but may be extremely resistant and drag on for weeks. In the course of such cases pernicious symptoms may develop and lead to death.

These were Bates's views when he went to Panama. He quickly had evidence of the severity of malaria infection but even the worst of those which recovered did not run courses like those indicated by the authors quoted.

When the author began to look more closely into the question and work out the cases with negative findings as regards parasites in the peripheral blood he soon found that the indefinite fevers of two weeks duration or so were really cases of mild typhoid. In this connection he points out that to get satisfactory bacteriological results it is necessary to make the blood cultures within 24 to 36 hours after admission, for it must be remembered that patients with this class of fever delay coming to hospital for from two to ten days.

One case of indefinite fever turned out to be due to *Histoplasma capsulatum*. Continuing his argument Bates reviews recent work on the question of the course or duration of malaria under treatment, a subject which has not received much attention. He quotes ROGERS, DEADERICK, CRAIG, and CHALMERS and CASTELLANI. All, save the last named, agree that malaria is a short fever and, if properly treated, is easily controlled by quinine. CHALMERS and CASTELLANI on the other hand record cases of sub-tertian infection in which "*the fever has remained unaffected while the parasites can be found in the peripheral blood notwithstanding several weeks' quinine therapy by various methods.*" As this statement is not to be interpreted in the light of too small dosage having been employed Bates states that he cannot explain it and would like the authors to do so.

Bates does not believe in varieties of parasites inherently resistant to quinine, nor in the production of quinine-fast strains, nor in the condition of the patient preventing quinine acting efficiently, nor in the virulence of malaria parasites differing in different tropical countries.

He states that in his opinion the apparently prolonged malarial fevers are fevers due to uncinnarial anaemia, kala-azar or typhoid either complicating the malaria or being wrongly diagnosed as malaria, and he lays great stress on the fact that malaria has no analogue in any other infectious disease.

He passes on to a consideration of atypical or mild typhoid in the tropics. His remarks on this subject need not detain us but the chart here reproduced is useful and interesting.

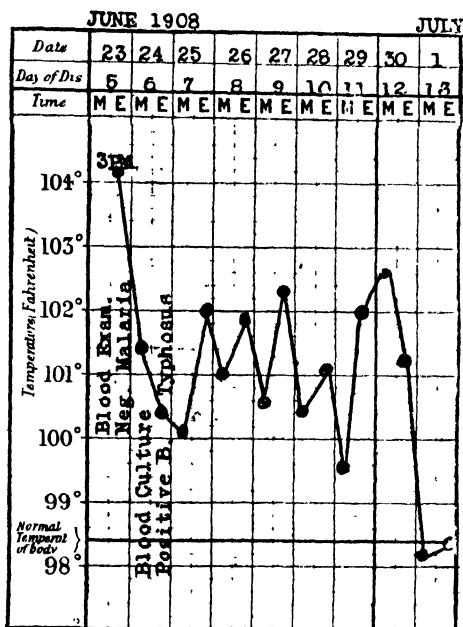


CHART. Typhoid fever with a temperature curve markedly similar to malaria fever. Cultures from blood positive *B. typhosus*. No malarial parasites found in the blood of the periphery.

In a discussion on the paper ROYER mentioned the continued fevers due to abdominal syphilis while DRECKS controverted the author's views. He finds that malaria, especially in a primary attack, does not always yield to heroic doses of quinine even in four days. Further, he objected to the expression malaria complicating typhoid fever. He considers that the diseases run hand in hand and he drew attention to the importance of paratyphoid infection and stated his belief in the occurrence of a true malarial dysentery.

[Whatever opinion may be held about some of BATES's views those with African experience will assuredly add trypanosomiasis to his three continued fevers and many will also doubtless remember cases of liver abscess and miliary tuberculosis which clinically were not at all easy to distinguish from malaria.



¶ In reality Bates's paper is largely a plea for the early and efficient treatment of malaria, for he would appear to admit that if malaria is not treated at least fairly adequately it may drag on as a febrile disease for days and weeks. A treated malaria is not a normal malaria. Therefore, throughout, the author is dealing with the disease under abnormal conditions and it is difficult to see why he should have delivered such a lengthy discourse on the subject.] A. B.

**STRINE (H. F.). Malarial Infection complicating Splenectomy.—U. S. Naval Med. Bull.** 1914. Oct. Vol. 8. No. 4. pp. 655-656.

The patient, who had suffered from malaria and had been treated by quinine, received a blow over the splenic region in a boxing match, which ruptured the spleen and necessitated splenectomy. The organ was found to be about three times its normal size.

Thirty-six hours after the operation his temperature rose to 104° and he was extremely anaemic and semiconscious. His blood contained numerous segmenting and ring forms of the malarial parasite but no crescents were observed. [The author evidently implies that a sub-tertian infection was present. If so, the presence of mature schizonts is interesting.]

Quinine hydrochlorate (gr. 35) and later neosalvarsan (gm. 0.6) were given. Twenty-four hours thereafter an enormous number of crescents was found in the peripheral blood, other stages being absent.

The patient's general condition improved. The quinine was discontinued after the first week and a second injection of neosalvarsan was given during the second week. Despite this treatment the crescents persisted, until 30 days after the operation 10 grains of quinine hydrochlorate were given and this dosage continued daily. Then they gradually diminished and disappeared on the fifty-fourth day.

Strine comments upon the case, pointing out that convalescence was apparently uninfluenced by splenectomy and that the differential leucocyte count remained practically normal throughout. He asks why there was a sudden outpouring of crescents on the third day. Did the ruptured spleen liberate them? If so they could not have been missed when the blood was examined on the second day. Were they drawn into the circulation from the bone marrow or elsewhere by the rapid cellular extrusion following severe loss of blood and splenectomy and after the shock and reaction had passed away?

He also asks why they disappeared. Did the quinine destroy them or were they still lodging in the bone marrow? He invites suggestions.

In a final note he says that the patient remained well for six months, when he again contracted a malarial infection. No crescents were found. [It is said that tertian malarial organisms were present. Does this mean benign or sub-tertian? If the latter it is quite possible the condition was a relapse.]

A. B.

**CARTER (H. R.). Report of a Case of Cerebral Malaria complicated by Ileus.—Proc. Med. Assoc. Isthmian Canal Zone.** Oct. 1912 to Mar. 1913. Vol. 5. Pt. 2. pp. 93-96.

Carter records a severe case of pernicious malaria in an adult male East Indian where the clinical picture was complicated by volvulus.

The paper must be consulted for details, which are carefully given. It is sufficient to note that quinine given at first intravenously and also subcutaneously in large dilution and then by the mouth cured the malaria and that large doses of morphine quickly relieved the intestinal condition.

A. B.

NELIGAN (A. R.). **Quinine Injections.** (Correspondence.)—*Jl. Trop. Med. & Hyg.* 1915. May 15. Vol. 18. No. 10. pp. 119–120.

A somewhat belated article from Persia on the vexed question of quinine injections. Neligan reviews previous correspondence and papers on the subject, gives an account of his clinical experiences in Teheran and states that, as a result, he has come to the conclusion that, when given in the right way, intramuscular injections of quinine are efficacious, quickly efficacious, and harmless. He does not think a case has yet been made out for their routine use, although he is prepared to admit that a course of quinine may very well begin with two injections of large doses. He reserves the method for cases complicated by severe indigestion, vomiting, diarrhoea, dysentery or coma, and as soon as possible starts oral administration. He uses the bihydrochloride and generally makes up his own solution which is a dilute one: 2 gm. of the salt in 10 cc. of filtered water. The solution is thrice brought to the boiling point and the injection made into the dorsal vertebral muscles, the glutei or the abductors on the outside of the thigh while the solution is still warm. A 10 cc. syringe is used and care is taken to wash off any quinine solution on the outside of the needle.

A. B.

REEVES (I. S. K.). **Malaria on U.S.S. "Tacoma" from February, 1913, to February, 1914.**—*U.S. Naval Med. Bull.* 1914. Apr. Vol. 8. No. 2. pp. 344–345.

A brief account of a small outbreak of malaria on board a United States war vessel which had been lying off Tampico in Mexico.

In severe cases or in those with gastro intestinal symptoms excellent results followed the intramuscular injection of chlorhydrosulphate of quinine. The pectoral muscle was found to be the most convenient site for injection.

A. B.

BRODRIBB (C.). **Intravenous Injection of Quinine.** (Correspondence.) *Indian Med. Gaz.* 1915. Jan. Vol. 50. No. 1. p. 33.

The author, writing from Secunderabad, gives an account of a case of malaria in which intravenous injection of quinine proved fatal. The patient was a European female, aged 34, fat and with alcoholic tendencies, who was admitted to hospital on September 20th, 1914, with a history of two days' fever, severe headache and slight cough. The throat was congested and there was an urticarial rash all over the face and body. The heart and lungs were normal and there was no enlargement of liver or spleen. The temperature was 100·8°, pulse 100 and respiration 22.

Calomel, aspirin and a diaphoretic mixture were administered and in the evening the patient was better. Blood examination showed many malignant tertian rings but no crescents. On the following day the patient had still further improved and was given quinine sulphate, 10 grains in solution thrice daily. The urine contained neither albumin nor sugar. In the evening the patient was not so well and next morning the temperature ran up to 106° F. with rapid pulse and increased respirations. As after sponging and the exhibition of aspirin there was still severe headache and restlessness, and as cerebral symptoms or hyperpyrexia might have ensued, recourse was had to an intravenous injection of quinine bihydrochloride in one pint of saline. This was well borne at the time, but about an hour later a dangerous collapse occurred, evidenced by profuse perspiration, rapid and low tension pulse, restlessness, dyspnoea and cyanosis. There was no pulmonary oedema but despite the use of adrenalin, stimulation and the administration of oxygen, which caused temporary improvement, the patient eventually became unconscious and died about 4½ hours after the injection. An autopsy was not permitted.

A. B.

- i. BOGAN (Fred M.). **Malaria cured by Neosalvarsan.**—*U. S. Naval Med. Bull.* 1914. July. Vol. 8. No. 3. pp. 457-458.
- ii. REED (E. U.). **Two Cases of Malaria treated with Salvarsan.**—*Ibid.* 1915. Apr. Vol. 9. No. 2. pp. 278-279.

i. An account of a case of "tertian" infection where succinimid of mercury and large doses of quinine both failed to cure. An intramuscular injection of 0.45 gm. of neosalvarsan was then given with the happiest results, the drug acting as a specific and with extreme rapidity. The one dose sufficed and there had been no relapse five months after discharge from hospital.

ii. In one instance two intravenous injections of 0.6 gm. of salvarsan sufficed to bring an obstinate case of malaria to an end; in another 0.9 gm. of neosalvarsan apparently cured a long-standing infection.

The author thinks the intravenous method has no advantages over intramuscular administration and is liable to cause a marked febrile reaction.

A. B.

**SUMMA. Malaria tertiana-Rückfälle unmittelbar nach energischer Salvarsan-Behandlung.** [Tertian Malarial Relapses immediately after Energetic Treatment with Salvarsan.]—*Arch. f. Schiff- u. Trop. Hyg.* 1915. Feb. Vol. 19. No. 4. pp. 108-112.

The author, who was the Principal Medical Officer of the Military Hospital, Windhuk, South West Africa, concludes from his own experience and that of his colleague WESTPHAL that salvarsan therapy is by no means an ideal method of eradicating malarial infection. In support of this view he records a number of cases of tertian malaria well treated by salvarsan which undoubtedly relapsed. The salvarsan was given intravenously and some of the cases received as many as six injections, the usual dose being 0.6 gm. This treatment freed the blood of parasites for the time being but, although the patients were transferred to localities known to be malaria-free, there appeared in their blood at varying intervals after the treatment both ring forms and gametocytes. Apart from the impossibility of fresh infection in the new

localities the presence of the sexual forms betokened true relapses, for the latter only occur in untreated or insufficiently treated cases. The shortest time between the treatment and the relapse was three weeks.

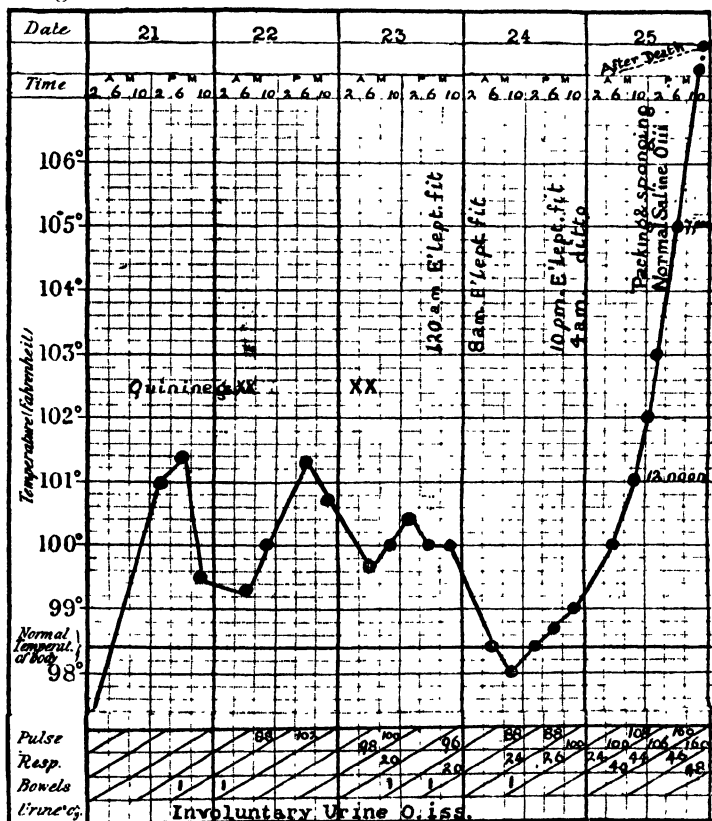
A. B.

POLLOCK (C. E.). *Salvarsan on Malaria.*—*Jl. R. Army Med. Corps.* 1915. Feb. Vol. 24. No. 2. pp. 181-183. With a chart.

A soldier at Port Louis, who was being treated for syphilis by salvarsan, developed sub-tertian malaria immediately after temporary loss of sight but without any other symptoms pointing to arsenical poisoning. Forty-eight hours after getting his last dose of salvarsan he was given 20 grains of quinine hydrochloride. His temperature rose in the evening. The quinine treatment was continued and four days after receiving salvarsan he had an epileptiform attack which was repeated later.

He became very ill, his temperature rose, unchecked by quinine given intramuscularly and duly absorbed, and he eventually died. The post-mortem findings are detailed. It is to be noted that malarial parasites were found in the choroid plexus, heart, blood and spleen.

The author asks if the case was one of cerebral malaria or of salvarsan poisoning.



The temperature chart, here reproduced, suggests the former but the injection of quinine failed.

The symptoms pointed to the latter but the patient stood his early course of salvarsan perfectly well. He was one of a batch of six men who were injected the same morning and none of the others had any reaction.

Pollock suggests that the quinine given 48 hours after the salvarsan formed with it some toxic combination. Major L. W. HARRISON, R.A.M.C., adds a note recording his belief that death was due to salvarsan plus malaria, while Major S. L. CUMMINS, R.A.M.C. reports on the tissues sent him and records his conclusions as follows :—

“(1). The death was *not* caused by malarial coma, although the man had malaria in a chronic form.

“(2). The state of the kidney is what, perhaps, might be expected from salvarsan poisoning.

“(3). There is some evidence of a recent considerable destruction of blood-cells.

“(4). There was nothing in the portion of brain examined to indicate gumma.”

[Taking into consideration the time when the man “went blind” it would seem that salvarsan poisoning might quite well account for the fatal issue.]

A. B.

VON EZDORF (R. H.). *Anopheline Surveys. Methods of Conduct and Relation to Antimalarial Work.*—*U.S. Public Health Rep.* 1915. Apr. 30. Vol. 30. No. 18. pp. 1311–1320. With 3 plates.

This is a useful, practical kind of paper which, while it contains nothing new, may be read with advantage by those engaged in anti-malarial work. As the author says, the local health officer should have the following information at his disposal :—

1. Amount and types of cases of malaria.
2. Seasonal prevalence in locality studied.
3. Location and kind of industries.
4. Form of water supply and drainage system.
5. Topographical and meteorological conditions, including :—
  - (a). Number of natural water courses.
  - (b). Natural direction of surface drainage.
  - (c). Presence of ditches and of low, poorly drained areas.
  - (d). Temperature.
  - (e). Rainfall.
  - (f). Direction of prevailing winds.

There are 34 known species of American anophelines and the following eight have been definitely shown to serve as hosts for the malarial parasites :—

<i>Anopheles albimanus</i> ,	<i>Anopheles quadrimaculatus</i> ,
„ <i>argyritarsis</i> ,	„ <i>pseudomaculipes</i> ,
„ <i>crucians</i> ,	„ <i>pseudopunctipennis</i> ,
„ <i>intermedium</i> ,	„ <i>tarsimaculata</i> .

Notes on the recognition of adult anophelines and of their water stages with appropriate illustrations lead to a consideration of the equipment when engaged on a survey. Here it is :—

“One small canvas bag.

“One white enamelled dipper, with hollow handle.

"One stick for making extension to handle of dipper, and for beating a way through brush, briars, or tall grass.

"One small glass dropper, with the tip cut off, so that the opening is about one-eighth inch in diameter. This to be used in securing larvae and pupae from the dipper.

"Six small vials.

"Six small pill boxes.

"One note book and pencil.

"One entomological bottle, 4 inches long, 1 inch in diameter (a large test tube will serve equally well), with cork. The bottom of the bottle is filled for a depth of 1 inch with cotton and rubber bands saturated with chloroform. This is covered with a circular disk of cardboard or thin layer of cork. This is to serve as a catching bottle for collecting adult mosquitos."

The method of procedure is outlined and the various breeding places which may be encountered are mentioned.

Amongst these may be specially noted hog wallows, pools amongst rocks, and water from ice plants and steam plants.

The author states that adult anophelines were collected from such divers places as :—

"Garrets, bedrooms, on walls, under mosquito bars, behind pictures, on clothing, behind doors and furniture, in barns, open fireplaces, privies, chicken coops, wood and coal sheds, stables, garages, under porches and buildings, in wind-protected corners of porches, in empty barrels, trash heaps, wagons, carriages, automobiles, on trunks of trees, in the hollows of trees and tree stumps, in caves, eroded overhanging banks of streams, and on spider webs."

The necessity for making privies mosquito proof is emphasized.

"Spider webs and cobwebs are favourite resting places for *Anopheles* mosquitos, from which they will fly upon the slightest disturbance. The *Anopheles* appear hanging from a web, and as many as 60 have been counted on a single web."

There is nothing requiring special notice in the very sound remarks on the keeping of records, on antimosquito measures and on the general management of a campaign.

A. B.

McGUIRE (L. W.). *Quinine Prophylaxis of Malaria*.—*U. S. Naval Med. Bull.* 1914. Oct. Vol. 8. No. 4. pp. 571–576.

The investigations here recorded were carried out upon American troops (Marines) on the small island of Culebra in the West Indies. Two regiments were concerned—the first 877 strong with 60 cases, a percentage infection of 6·8, the second 852 strong with 49 cases, a percentage infection of 5·8.

The troops were exposed to infection during night manœuvres and it is stated that the variation of mosquitos in different localities probably accounted for the discrepancy in the percentage of infections of different detachments, irrespective of the density of the native population.

The latter numbers about 750 living chiefly in two small towns. From an examination of native children (method employed not stated) the malarial index is given as about 75 per cent.

The following tables summarize the author's observations.

(C163)

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TABLE I.

	3-inch battery (161 men).	Companies C and I (242 men).	Company F (126 men).	Company E, Signal Corps (125 men).*	Company H (131 men).
Regiment ..	First.	First.	First.	First.	First.
Date of landing ..	Jan. 13, 1914.	Jan. 13, 1914.	Jan. 13, 1914.	Jan. 13, 1914.	Jan. 13, 1914.
Re-embarked ..	Feb. 6, 1914.	Feb. 6., 1914.	Feb. 6, 1914.	Feb. 6, 1914.	Feb. 6, 1914.
Quinine prophylaxis ..	Yes.	Yes.	Yes.	Part of time.	Yes; after Jan. 26.
Amount ..	8 grains.†	10 grains twice a week.	7 grains daily for first 2 weeks, then 5 grains.	7 grains daily after first 10 days.	6 grains twice a week.
Location of camp ..	Low and near village of Roosevelt.	Point Vaca, high.	Point Soldado, high.	Old naval station.	Near Dewey, high.
Mosquitoes ..	Numerous.	Few.	Few.	Numerous.	Not abundant.
Net protection ..	Yes.†	Yes.†	Yes.†	Yes.†	Yes.†
Per cent. of infection ..	12.4.	3.3.	2.3.	11.2.	2.2.

Type of malaria (percentage), estivo-autumnal, 25; tertian, 75.

\* Signal company was scattered at times over various parts of the island.

† Eight grains for 10 days, then 6 grains, skipping 2 days separately each week.

‡ Except when exposed during night manœuvres.

TABLE II.

	Main camp (602 men).	Company A (122 men).	Company D (128 men).
Regiment ..	Second.	Second.	Second.
Date of landing ..	January 11th, 1914.	January 11th, 1914.	January 11th, 1914.
Re-embarked ..	February 6th, 1914.	February 6th, 1914.	February 6th, 1914.
Quinine prophylaxis ..	None.	None.	None.
Per cent. of infection ..	4·3.	3·2.	14·8.
Location of camp ..	Near Dewey, elevated.	High, on small island, Culebrita.	Low, Mangrove Harbour.
Mosquitoes ..	Not numerous.	Not numerous.	Numerous.
Net protection ..	Yes.*	Yes.*	Yes.*

Type of malaria (percentage), estivo-autumnal, 48·8; tertian, 51·2.

\* Except when exposed during night manœuvres.



After discussing the experiences of some other officers of the United States Navy as regards quinine prophylaxis in the Panama Canal Zone and quoting various authorities as to dosage and method of administration McGuire advances the following conclusions:—

"1. Quinine in doses of from 5 to 8 grains daily will not prevent malaria, although it may retard or delay the symptoms.

"2. Persons infected with malaria while taking quinine prophylaxis may not show any evidence of the disease while taking the quinine, but when it is discontinued will come down with acute malaria paroxysms.

"3. After taking quinine for a long period a certain tolerance for the drug may be established, causing more difficulty in permanently curing these cases.

"4. Quinine prophylaxis often masks malaria, the symptoms being atypical, and often banishes the parasite from the peripheral circulation, rendering the exact diagnosis very difficult.

"5. It is believed that the eradication or great reduction of malaria in districts which were formerly infected was due to the treatment of the disease already present, combined with improved sanitary conditions, which destroy the mosquitoes and larvae, rather than to preventing infection by so-called prophylactic doses of quinine.

"6. To prevent malaria the ideal method is to eradicate the mosquitoes, if possible, or to prevent the mosquitoes from biting by net protection, combined with the treatment of persons already infected, thus eliminating the source of infection.

"7. Quinine prophylaxis as a routine is not advised, but for an expeditionary force during a short, active campaign in a malarial country it is believed that malaria paroxysms can be held in abeyance temporarily in a certain proportion of the men by giving quinine, 5 to 10 grains daily."

A. B.

**POLLOCK (C. E.). Notes on the Incidence of Malaria among European Troops in the Sierra Leone Command, with Special Reference to the Effect of Mobilization.—*Jl. R. Army Med. Corps.* 1915. Feb. Vol. 24. No. 2. pp. 118–120.**

An account of the results obtained by the prophylactic administration of quinine in the case of men of the Royal Artillery and Royal Engineers in garrison at Sierra Leone from October 1913 to the end of January 1915. The number of men under observation was nearly 300.

The hydrochloride was given in solution at first in doses of 15 grains twice a week and then, owing to the unpleasant symptoms produced, in 10 grain doses twice weekly.

Tables show that the incidence of malaria depended more on the degree of exposure to infection than on the length of service, and that after six months' residence despite the prophylactic measures, which included screening of barrack rooms and the use of mosquito curtains, roughly 75 per cent. of the troops suffered from malaria even though the rainfall during this period was the lowest ever recorded in Sierra Leone.

There was some evidence to show that the dose of quinine precipitated a malarial attack.

The author concludes that quinine prophylaxis, as carried out, was not very successful and that it accounted for some of the anaemia and debility which the men presented. [It would seem that none of the preventive measures were efficient and in the absence of more

information the results recorded cannot be considered as very enlightening. Many more details are required, as will be evident from a study of STORR's paper on his work at Mandalay. See above ]

A. B.

PARROT. **La Quinisation préventive dans les écoles primaires d'Algérie.**—*Malariologia (Propaganda Antimalarica)*. 1915. Apr. 15. Vol. 8. No. 1-2. pp. 12-16. With 3 diagrams.

A brief account of the methods followed and the results achieved in the systematic quinisation of children attending the primary schools in Algeria. The salt of quinine used is the bihydrochloride and it is given daily in doses of 20 centigrammes to all between the ages of 5 and 19 years. The chocolate tablets with tannate were tried, but did not prove a great success. The measure has now become popular, the results are very satisfactory, and the author lays stress on the educative rôle which such school quinisation plays.

A. B.

MEMMI (Guglielmo) & MARTELLI (Pier Nello). **La Malaria nell' Ospedale di Grosseto negli anni 1913-1914. Rendiconto statistico.**—*Malariologia (Propaganda Antimalarica)*. 1915. Apr. 15. Vol. 8. No. 1-2. pp. 17-27.

The authors remark that the number of cases of malaria admitted into a general hospital is a very reliable index of the amount of malaria in the district served by it. The annual number of cases admitted to the hospital at Grosseto has fallen continuously during the last 15 years from 1704 in 1900 to 78 only in 1914. Out of this latter number there were three deaths in all, from aestivo-autumnal fever; two of the cases being in octogenarians and one in a child aged six years.

J. B. N.

PELOSI (Giovanni). **Relazione della Campagna antimalarica del 1913 nel Comune di Foliano Valfortore.**—*Malariologia (Propaganda Antimalarica)*. 1915. Apr. 15. Vol. 8. No. 1-2. pp. 34-38.

The anti-malarial campaign in Italy is now being very properly extended to the winter treatment of the chronic cases of malaria, who serve as reservoirs of the disease when the hot season arrives. In the district in question 29 of such patients were treated with State quinine during the months of January, February and March, 1913. The general prophylactic treatment of the population was commenced on the 8th of May, and continued until November, 350 individuals being submitted to it in all; 69 cases of malaria occurred during that period, of which two were fatal. The usual complaints are made as to the apathy of the poorer classes of the community in connection with this beneficent measure.

J. B. N.

**FLU (P. C.). Malaria en malariabestrijding.** [Malaria and its Prevention.]—23 pp. 1914. Batavia : Javasch Boekhandel en Drukkerij.

A pamphlet written in a popular style, and evidently intended for perusal by non-professional people. The author commences with a short account of the successive steps in the discovery of the nature of malaria, and then proceeds to describe with suitable brevity the natural history of the mosquito. Practical directions for building houses in mosquito-affected localities follow, and the paper is terminated by rules for the self-administration of quinine.

J. B. N.

**GASBARRINI (A.). i. Studi sulla malaria. 2<sup>a</sup> nota. Ancora sulla deviazione del complemento nell'infezione malarica.** [Further Remarks on the Deviation of Complement in Malaria Infections.]—*Clinica Med. Ital.* 1914. Sept. Vol. 53. No. 10. pp. 665-677.

**ii. 3<sup>a</sup> nota. Sul comportamento della reazione di Wassermann (metodo originale e modificato) e della prova di Pick, e Pribram nella malaria.** [The Behaviour of Wassermann's Reaction, both Original and Modified, and of Pick and Pribram's Reaction, in Malaria.]—*Malaria e Malat. d. Paesi Caldi.* 1914. July-Aug. Vol. 5. No. 4. pp. 231-253.

i. In a note published in *Zeitschrift für Immunitätsforschung und experimentelle Therapie* the author suggested the employment of the Bordet-Gengou reaction as a means of diagnosis in latent malaria [see this *Bulletin*, Vol. 3, p. 145.] He now furnishes the results obtained from 22 cases of malaria, acute and chronic, as follows:—

1. The blood-serum from cases of malaria, taken during either the rigor or the febrile stage, and for a few days after an acute attack, will deviate complement, if it has first been deprived of its natural haemolytic amboceptors by Rossi's method. This consists in mixing 1.5 cc. of the serum with 0.5 cc. of well-washed sheep's corpuscles, and keeping the mixture in ice for 20 to 30 minutes. The corpuscles are then removed by centrifuging in a tube kept cool with ice.

2. In latent malaria, the same reaction may be obtained, but more feebly.

3. In chronic malaria the reaction is always negative.

ii. The contents of this paper are nearly the same in substance as those of the previous one, with the exception that the author tried Desmoulière's modified antigen. This is prepared by triturating, and drying at blood heat, human syphilitic liver, taken from the body within 48 hours after death. The dried powder is extracted with anhydrous ether to remove all fats, fatty acids and cholesterin and the extracted powder is again dried in the incubator and then macerated in absolute alcohol for 72 hours, in the proportion of one gramme to every 20 cc. To every 10 cc. of the cooled and filtered alcoholic solution 10 centigrammes of pure powdered cholesterin is added. The antigen thus obtained must be kept at room temperature and out of the influence of light. For use it is diluted with 15 times its volume of normal salt solution, and is employed for the Wassermann test in the quantity of 0.3 cc. (*Presse Médicale*, 1913, Nov. 5. No. 90). The author finds that an antigen thus prepared acts quite as well as a simple aqueous extract of syphilitic liver.

With the Brendel-Müller method the author finds that the reaction of malarial serum is less pronounced than with the unmodified Wassermann process. This reaction is based on the following principle. The serum of a presumed syphilitic subject is first incubated for 25 minutes at blood heat with a tested antigen, and the required quantity of sheep's corpuscles, suspended in salt solution, is then added. If the serum contains specific antibodies, haemolysis does not occur, or is much reduced from the weakening of the complement by the heating. (*Münch. Med. Woch.*, 1912. No. 32, p. 1,754).

In latent malaria Pick and Pribram's phenomenon is not obtained. It is based on the fact that specific sera extracted with ether acquire an anti-complemental power, so that they react without the addition of extract, in the presence of guinea-pig complement (*Biochem. Woch.* Vol. 9. Nos. 5-6).

J. B. N.

**SUTHERLAND (W. D.) & MITRA (G. C.). The Wassermann Reaction in Malaria, Kala-Azar and Leprosy.**—*Indian Jl. Med. Res.* 1915. Apr. Vol. 2. No. 4. pp. 984-989.

The authors go fully into the literature of the subject. Finding the results greatly at variance they proceeded to examine the blood of 50 cases with a view to ascertaining definitely if malarial infection influences in any way the Wassermann reaction. Of the 50 cases, 32 were benign tertian, 17 malignant and one of both these varieties (mixed infection). No quartan cases are recorded.

	Cases.	Positive W.R.	Percentage.
Cziknawerow .. ..	13	..	..
Manu Muscel and Vasilu ..	12	..	..
Schoo .. ..	38	22	57·89
Weinfurter .. ..	1	1	100
Bates .. ..	167	37 (30 lues)	22·15 (4·19)
Fletcher .. ..	50	..	..
S. and M. .. ..	50	9	18
	331	69	21
or, deducting the known lues cases .. ..	..	39	11·8

They give a table, here reproduced, comparing their results with those of other workers and conclude as follows :—

“ Our own figures are thus seen to be akin to those given by Bates and by Fletcher. Schoo's figures *may* be true of Holland ; they certainly do not seem to indicate the real state of affairs in the tropics. Of our 9 positive cases at least 3 were probably syphilitic, which brings our percentage down to 12 or very nearly the 11·8 given above. It must be remembered that our positive results were obtained during the *acute* attack. Chronic malaria does not affect the Wassermann reaction at all, and in our opinion all that a physician has to do is to wait until his patient's peripheral blood has been clear of parasites for, say, a week before he sends him to have his Wassermann reaction taken.”

A. B.

MATHIS (C.) & HEYMANN (P.). *La Réaction de Wassermann dans le paludisme.*—*Bull. Soc. Path. Exot.* 1915. May. Vol. 8. No. 5. pp. 258-259.

The authors, working in French Indo-China, examined 21 cases of recent and long-standing malarial infection (13 malignant, 5 benign tertian and 3 quartan) for the Wassermann reaction and obtained a uniformly negative result. They give no details, merely remarking that they used the technique in force at the Pasteur Institute in Lille and employed as antigen the liver from a case of hereditary syphilis. Their references to the literature are incomplete.

A. B.

PEREKROPOFF (G. J.). *Ueber Kulturen der Plasmodien des tropischen Fiebers (Malaria tropica).* [The Culture of the Plasmodium of Tropical Malaria.]—*Arch. f. Protistenkunde.* 1914. Nov. 3. Vol. 35. No. 2. pp. 139-153. With 3 plates.

The author declares that by employing a slight modification of the method of BASS and JOHNS [see this *Bulletin*, Vol. 1, pp. 22-24; and Vol. 3, p. 438] he was able in two cases out of seven to observe *in vitro* not only the schizogony of *P. falciparum* but its cycle of sporogony with the formation of sporocysts in the red cells and the discharge of sporozoites from these erythrocytes. His method differs from that of BASS and JOHNS in the following particulars.

1. He used four times as much 50 per cent. dextrose solution, i.e., 0.4 cc. to 10 cc. of malaria blood.

2. He inactivated the blood serum [presumably he means defibrinated blood] for a longer period, i.e., for half an hour at 41° C. and for another half-hour at 42° C.

3. He transplanted to blood serum [defibrinated blood ?] wherein the complement had been killed at 55 to 56° C.

4. This transplantation was made five to six hours after the normal segmentation of the parasites had taken place.

5. The material was transferred to a rich medium which is made by adding 0.04 cc. of a 50 per cent. dextrose or maltose solution to 0.2-0.4 cc. blood serum [defibrinated blood ?].

6. After transplantation the proportion of parasite-holding red cells to fresh erythrocytes is as two-fifths to three-fifths.

7. Omission of the centrifugation of the infected blood in order to avoid any traumatism.

The blood was taken from the patient five hours after the malarial attack and two to three hours after a full meal, at a time when the temperature was low. Specimens were examined at intervals of two, four and six hours, films being made on cover glasses, fixed in methyl alcohol and stained with Giemsa. The transplantation was effected after 24 hours, at the time of sporulation, and also six hours later, the latter method yielding better results.

The two successful cases were both fresh infections and from both 20 cc. of blood were taken for purposes of the research.

At first free-swimming merozoites could be observed, which after five or six hours were found attached to the red cells or already inside them.

The author describes and illustrates the development both of the ordinary schizonts and of the young endoglobular gametes. In some of the red cells Maurer's dots were well marked. The various stages are described in great detail but the chief phases of development may be given more or less in the author's own words as follows :—

(i). The development of the parasites *in vitro* at 41° C. with pigment formation commences in the fourth hour of incubation.

(ii) Between the seventeenth and twenty-fourth hours schizogony can be seen. In a few cases this occurs also at the twenty-seventh hour.

(iii). Gamete formation begins at the seventeenth hour and continues up to the twenty-seventh hour.

(iv). The formation of ookinets [travelling vermicules] commences at the twenty-seventh hour. In a few cases this process can be observed at an earlier period.

(v). Sporocysts form at the thirtieth hour. They occur *in the red blood corpuscles*, which bear the same relation to the sporocysts as does the membrane of the mosquito's stomach to the familiar oocyst.

(vi). Bursting of the sporocysts and the setting free of masses of sporozoites are phenomena met with at the fortieth hour.

(vii). By the forty-third hour the cycle of development is at an end and the sporozoites are invading the red cells.

[All these stages are illustrated by three coloured plates which, whatever may be thought of their significance, are undoubtedly well executed. It may, however, be said that the so-called red cell sporocysts bear no resemblance in structure or size to the well-known oocysts seen in the stomach of an infected anopheline.]

Some of the drawings are supposed to show in addition another developmental process, also partly described in the text, namely, schizogony of the macrogametocyte [parthenogenesis.]

A few other points may be noted. The discharge of merozoites after complete schizogony could not be demonstrated in stained preparations. As ZIEMANN noted, it evidently takes place fairly quickly. By the twenty-fifth hour it was possible to differentiate the male and female crescents. Copulation of the gametes was observed at the twenty-seventh hour. The occurrence of flagellation is mentioned but the conditions under which it was seen are not described. [If gametocytes were present in the warm culture they would naturally flagellate when removed to a slide just as in the case of an infected human being. As the author distinctly states that he could not demonstrate flagellation in stained films of his culture, there is no evidence to show that it actually did occur in his culture tubes.]

The author assumes that long continued and obstinate cases of malaria are to be explained partly by parthenogenesis of the female crescent and partly by a formation of sporocysts in the patient's blood just as he has observed it in culture, and he believes that GLOGNER's hypothesis of gamete copulation in man is now proved to be correct.

The bursting of the oocysts seems to occur fairly rapidly, for sporozoites are rarely found near an oocyst.

It was possible to observe a cycle of schizogony throughout a second generation of parasites. In 48-hour cultures a continuation of sporozoite formation followed by an invasion of red cells was noted, and later

small, round or sickle-shaped sporozoites which did not enter erythrocytes could be seen free in the plasma. The parasites lived *in vitro* for 5½ days, at the end of that time representing the beginning of a fifth generation if 27 hours is taken as the period for one generation to accomplish its development. Thereafter degeneration and death occurred.

[Although this is a very interesting paper the nomenclature is somewhat confused and one cannot help feeling that Perekropoff has, here and there, rather taken things for granted. Certainly in view of the locality of his so-called sporocysts, the temperature at which development took place, the size of the cysts and their general characteristics, confirmation of his research is required before his findings can be accepted. Important links in the cycle of development are missing and though, if his work is substantiated, it will mark a distinct advance in our knowledge, it would be well at present to mingle interest in it with a little healthy scepticism.]

A. B.

**MACGILCHRIST (A. C.). Quinoidine : Its Characters, Composition and Lethality to Protozoa. (Cinchona Derivatives Inquiry.) Fourth Communication.—*Indian Jl. Med. Res.* 1915. Apr. Vol. 2. No. 4. pp. 888–906.**

Quinoidine is a mixture of the uncrystallizable alkaloids in cinchona bark and bears the same relation to the crystallizable alkaloids, quinine, quinidine, cinchonine and cinchoninidine that molasses does to sugar. The term “amorphous alkaloid” loosely used in the past should never be applied to it nor to the residual alkaloid from which it is obtained. This residual alkaloid, derived from the bark of *Cinchona ledgeriana* after the quinine has been extracted, consists of the remaining crystallizable bases plus all uncrystallizable bases plus impurities.

Commercial quinoidine is represented by the masses containing these uncrystallizable bases plus impurities. It varies in physical characters and may contain traces of crystallizable alkaloids. It is believed to consist chiefly of the uncrystallizable anhydro-bases—diquinicine and dicinchonicine—which unlike quinine and cinchonicine (products of manufacture) exist naturally in the bark.

Quinoidine is almost insoluble in water but dissolves readily in dilute acids, alcohol and chloroform. In ether it is only partly soluble. SETHURNER, PRAIN and WATERS have stated that quinoidine has a greater anti-malarial effect than quinine. Indeed the last-named found that while it caused no nausea or other unpleasant effects it was from three to five times as effective as quinine sulphate and he introduced a preparation called *Laverain* containing 1/3 grain ammonium picrate and 1/32 grain arsenious acid to every 2 grains of quinoidine.

MacGilchrist, considering quinoidine worthy of investigation, obtained some of tarry consistence from Mungpoo.

He gives the results of its analysis, which was chiefly conducted by his assistant Dr. SARKAR, and for the details of which the original paper must be consulted.

Having found that the non-alkaloidal portion of quinoidine contained no active principle he proceeded to test the pure quinoidine

alkaloid as regards its lethality on the lines adopted in his previous work [see this *Bulletin*, Vol. 5, p. 49]. He found it not nearly so deadly to *Paramoecium* and other protozoa as is quinine hydrochloride and he promises to show in a future communication that quinoidine is much inferior to quinine as an anti-protozoal or anti-malarial agent.

At the same time he explains how PRAIN was probably led into error by a faulty assumption.

A. B.

**LAWSON (Mary R.). Adult Tertian Malarial Parasites attached to Peripheral Corpuscular Mounds. The Extracellular Relation of the Parasite to the Red Corpuscles.**—*Jl. Experim. Med.* 1915. June. Vol. 21. No. 6. pp. 584-592. With 4 plates.

The author's previous work on the migration of malarial parasites and their exclusively extra-corpuscular situation are now well known. [See this *Bulletin*, Vol. 4, p. 85 and p. 293]. In this paper she deals again with the latter theory and seeks to prove that the plasmodium attaches itself to the outer surface of the red cell by means of pseudopodia which encircle a portion of the haemoglobin substance. The latter gets squeezed up into a mound, the base of which is clasped by a single pseudopodium or by two pseudopodia meeting and fusing. She says:—

"I believe that the first pseudopodia thrown out arise from the cytoplasm of the parasite near the nucleus. Other (accessory) pseudopodia may be thrown out from any part of the cytoplasm, whenever it becomes necessary for the parasite to secure a firmer hold on the red corpuscle; i.e., when a corpuscular mound to which it is attached becomes dehemoglobinized (decolorized), or as the parasite increases in size.

"A very young parasite may find it necessary to use its entire cytoplasm in order to encircle a corpuscular mound, thus giving the appearance, when attached to a surface mound, of a very slender ring with a chromatin dot. When a corpuscular mound encircled by a young parasite is viewed from above, the characteristic ring-form parasite picture is seen."

Referring to the remarkably interesting plates of benign tertian infection which illustrate the article, she points out that the mounds are clearly visible and that though the pseudopodia may be wholly or in part obscured by the nuclei of the attached parasites they can frequently be traced round the peripheral mounds. The latter usually becomes quickly decolorized and the author believes that the "achromatic area" or "milky zone" so long believed by many to be an integral part of the malarial parasite is in reality a decolorized, peripheral corpuscular mound. As an additional proof of the extracellular position of the young parasites she cites the fact that their nuclei or protoplasm may be often seen projecting beyond the periphery of the red cell. [This is certainly well brought out by four of the microphotographs.]

After some remarks on the irregularity of pigment formation in connection with the young parasites and a note to the effect that the absence of pigment does not necessarily mean that no damage has been done to the red cell, the question of multiple infection of corpuscular mounds is considered. It is stated to be an accidental occurrence.

The author has extended her investigations to adult tertian parasites, which she believes may act just like the young plasmodia, though their



constricting effect upon the mounds appears to be greater and their nuclei usually hide the encircling pseudopodia while they bring about more rapid dehaemoglobinization. Adult parasites are, however, usually seen attached to surface mounds and the infection of peripheral mounds is easily overlooked and it is only to be found in any abundance shortly after a parasitic migration at a time when the infected red cells are not badly damaged.

Conjugation has never been observed and Lawson summarizes her interesting and heterodox views as follows :—

"1. The malarial parasite is extracellular throughout its entire life cycle ; that is, when it is not free in the blood serum, it is attached to the external surface of the red corpuscle.

"2. Adult parasites follow the same procedure in attaching themselves to the outer surface of the red corpuscles as do the young parasites.

"3. Adult parasites are most frequently seen attached to surface corpuscular mounds.

"4. Corpuscular mounds projecting at the periphery of the red corpuscles and encircled by the pseudopodia of adult parasites, are proof positive of the extracellular relation of the adult parasite to the red corpuscle.

"5. Adult parasites attached to peripheral corpuscular mounds are only found in appreciable numbers when the red corpuscles are not badly damaged, so that the mounds show more or less hemoglobin content.

"6. The nuclei or protoplasm of adult parasites extending beyond the periphery of the red corpuscles is additional evidence of the extracellular relation of the parasites to the red corpuscle."

The coloured plate which she presents is well worthy of attention and study.

A. B.

STEVEN (W. S. R.). Report on an Investigation in regard to the Prevalence of Malaria amongst the Troops stationed at Karachi, 1913.—*Jl.R. Army Med. Corps*. 1915. Mar. Vol. 24. No. 3. pp. 251-261.

There is nothing new in this paper, which is chiefly of local interest. During the last five months of 1913 there were 380 admissions for malaria occurring amongst the British troops at Karachi and the author's report explains the reasons for the outbreak and recommends measures for the prevention of any recurrence.

Anopheline breeding places are described and the larvivorous fish *Lebias dispar* was found to be effective in keeping mangrove swamps, streams, pools, etc., free of larvae.

The Anophelines found were *Nyssomyzomia rossi*, *Neocellia stephensi* and *Cellia pulcherrima*.

A. B.

NICOLLE (Charles). Le rôle des moustiques dans la transmission du paludisme suspecté en 1774.—*Bull. Soc. Path. Exot.* 1915. May. Vol. 8. No. 5. pp. 279-280.

The Abbé Jean-Baptiste de Fortis in his book "Voyage en Dalmatie," dated 1774, records a conversation with a certain ecclesiastic who expressed the opinion that many of the fevers of Dalmatia were due to the bites of mosquitos which had previously fed on a dead body or on a poisonous plant.

The Abbé states that he considers the idea ingenious and that possibly the miasmas might also be attributed to this cause.

Nicolle comments shortly upon this early opinion and by a further quotation shows that the Abbé was not quite so sound a reasoner as he appears from his remarks on malaria and mosquitos.

A. B.

O'CONNELL (Mathew D.). *The Meteorology of Malaria.*—*Jl. Trop. Med. & Hyg.* 1915. May 1. Vol. 18. No. 9. pp. 97-99.

The author discusses the atmospheric conditions obtaining at Culebra, the central station of the Panama Canal, and compares them with those found in spinning and weaving sheds in Lancashire and Ireland. As already pointed out in this *Bulletin* [Vol. 2, p. 545] he is of opinion that such conditions can of themselves produce fevers of a remittent and intermittent type.

A. B.

i. SERGENT (Edmond & Etienne). *De quelques préjugés en matière de paludisme.*—*Propaganda Antimalarica.* 1914. Dec. 31. Vol. 7. No. 6. pp. 163-168.

ii. SERGENT (Edmond). *L'idéal d'un Roi d'après Goethe. Un précurseur de l'antipaludisme.*—*Ibid.* pp. 169-170.

i. In this little pamphlet the authors detail the erroneous views commonly held by the public in Algeria as regards malaria and show how they may best be corrected. They consider such questions as the relation of malaria to soil disturbance, the reason why a cold bath is supposed to be a cause of fever, the relation of trees to mosquito prevalence. Further they deal with such fallacies as the view that quinine enlarges the spleen, and that it causes abortion. [As these kind of questions crop up in most tropical countries this pamphlet should be useful for practitioners who have to disabuse the minds of their patients as regards such fallacious ideas.]

ii. Dr. Sargent quotes Faust to show that Goethe's ideal of a sovereign and of a benefactor of mankind was, as indicated by the passage cited, one who accomplished anti-malarial work and declared war on the breeding grounds of anophelines.

A. B.

MAGGIORE (Salvatore). *Rilievi statistico clinici sulla malaria infantile nella Città e Circondario di Palermo.* [Clinical Statistics with regard to Infantile Malaria in the City and Suburbs of Palermo.]—*Pediatria.* 1915. June. Vol. 23. No. 6. pp. 449-452.

A short report on the nature of 91 cases of malaria observed in children under five years of age during the three years 1912-1914. Out of this total 36 were of children under two years of age. The cases of estivo-autumnal fever showed none of the malignity so often seen in adults with that form of malaria. It is remarked that in children of these tender ages the spleen is usually but little enlarged, and the enlargement can often only be made out by percussion. Even in chronic cases of estivo-autumnal fever, the spleen never reaches the dimensions found in kala azar.

J. B. N.

## BLACKWATER FEVER.

**AFRICA. Blackwater Fever in the Tropical African Dependencies. Reports for 1913.**—96 pp. 1915. London: Printed under the Authority of H. M. Stationery Office. (Cd. 7792). Price 1s. 0d.

This Blue Book consists chiefly of records of blackwater fever cases observed during 1913 in the Gold Coast, Nyasaland, Uganda, Northern and Southern Nigeria, Sierra Leone and the East Africa Protectorate. No cases occurred in the Gambia. It is copiously supplied with charts and tables and, while doubtless a useful contribution to the literature, cannot be easily dealt with in a short summary, for much of its value depends upon the details of the cases. Hence only a few points will be noted here. It will certainly be an advantage when the new schedule, a modified form of that prepared by STEPHENS [see this *Bulletin*, Vol. 5, p. 254], comes into use. The following statistics as regards the number of cases in each colony or protectorate and the corresponding mortality rates are interesting:—

	<i>Cases.</i>		<i>Percentage mortality rate.</i>	
Gold Coast.. ..	21	..	33·3	
Sierra Leone .. ..	10	..	10	
Southern Nigeria .. ..	21	..	23·8	—One case may have been yellow fever.
Northern Nigeria .. ..	17	..	35·29	
East Africa Protectorate..	15	..	26·6	
Uganda .. ..	58	..	20	
Nyasaland .. ..	7	..	14·2	

There is a great similarity about the clinical records of the cases and in most instances the close association with malaria and also with the intermittent taking of quinine is well marked. The exact relationship of the latter to the onset of the disease could, however, only be accurately determined in the manner adopted by STEPHENS and STOTT in their research, recently reviewed in this *Bulletin* [Vol. 5, p. 354].

Of special interest are the observations of COOK, included as an appendix to the Uganda report. He cites five cases which tended to show that tick (*spirillum*) fever and not malaria had acted as a predisposing cause. The temperature chart which he gives of one of the cases is very suggestive of relapsing fever.

Other matters worth noting are the number of children who suffered from blackwater, the presence of a benign infection running concurrently with the attack, as reported by STANNUS from Nyasaland, the danger of the patient being left with damaged kidneys, the inadvisability of moving a patient suffering from haemoglobinuric fever, and the association of the disease with a special locality, as instanced by BARCLAY of Blantyre in the case of a patient who lived in a house with the following remarkable history:—

“(1). The original occupant died on the way home. He is said to have died of malaria.

“(2). The second occupant, an Italian, was found dead in bed by myself in 1906, having died about two hours before I reached him; his temperature when I saw him was 104°, and there was no doubt he died of severe malaria.

"(3). The third occupant suffered various severe attacks of malaria, and eventually died in Zomba Hospital from an attack of blackwater.

"(4). The present patient went to live there on the 20th August, 1912, and developed blackwater on the 26th April, 1913. At present the house is unoccupied."

All the reports give information as regards the insect fauna of the district where the cases occurred, but this is of such a general nature that it is not as a rule of much value from the etiological point of view.

A. Balfour.

BURKITT (R. W.). *Blackwater Fever*.—*Lancet*. 1915. May 1. pp. 908-909. With a chart.

Burkitt, writing from Nairobi, records two cases of blackwater fever successfully treated by neosalvarsan. He speaks of its apparently wonderful effect in these two instances, for both of them were severe and the first was practically in a hopeless condition when the drug was tried. In this case a single dose of 0.9 gm. was given intravenously with 2 pints of saline, and a marked change for the better was apparent within two hours. Vomiting ceased, the temperature fell, insomnia disappeared and the urine cleared up. Previously the patient, aged 28 and with a malarial history, had been given saline infusions, calcium chloride, pituitary extract, morphine and hyoscine. [It is worth noting that the day before the neosalvarsan was given vomiting ceased for six hours, and it is just possible that the improvement following the neosalvarsan was due in part to the other remedial measures adopted].

The same dose was used in the second case, a man aged 50 who had suffered from a severe attack of blackwater 25 years previously. The record of the case certainly shows that he was doing very badly until the neosalvarsan was given, and that his illness took a marked change for the better after the injection.

[More cases must be recorded before the exact value of neosalvarsan in this condition can be determined, but at least the drug did no harm, and it is interesting to compare Burkitt's results with those of WERNER. See this *Bulletin*, Vol. 4, p. 376.]

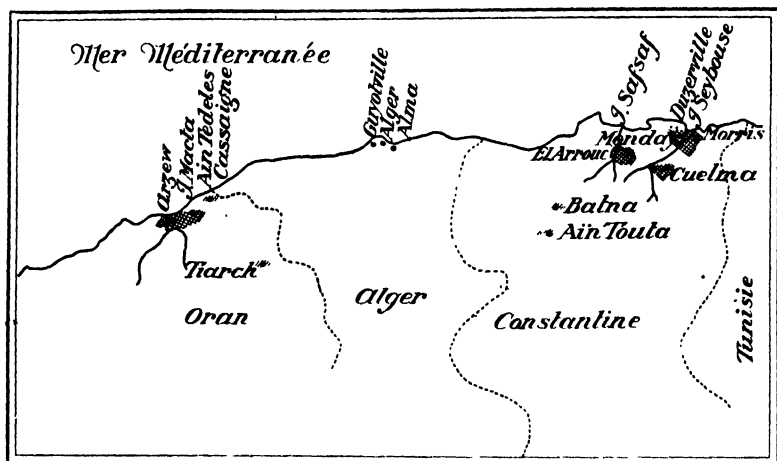
A. B.

PARROT (L.). *Essai sur la fièvre bilieuse hémoglobinoïdique en Algérie*.—*Malariologia (Propaganda Antimalarica)*. 1915. Apr. 15. Vol. 8. No. 1-2. pp. 27-33. With 1 map.

It has generally been supposed that blackwater fever is rare in Algeria, but this is not altogether the case. Up to 1904 it had received very little consideration but in that year the Sergeants drew attention to certain records regarding it, which showed that in certain districts it was far from uncommon, and that it was most frequent in the regions where malaria was severe.

As a result of his inquiries Parrot has prepared a chart, here reproduced, showing the areas from which blackwater cases have been recorded. It will be noticed that these are nearly all on the sea coast or close to it, and further that they are in the neighbourhood of the

mouths of streams, or in the hollows of the valleys which these streams water. On the high plateaus the cases do not seem to be very numerous.



Sketch of Algeria, showing the foci of blackwater fever.

The close association of haemoglobinuric fever and malaria is well marked, and the best way to get rid of the former is to fight the latter. Apparently no case of blackwater has yet been recorded amongst the indigenous Arabs and Berbers.

The epidemiology of the disease is briefly considered, but the only points in the paper requiring further notice are the statements that the abuse or untimely ingestion of quinine do not seem to play a part in producing the condition, at least in the great majority of cases, and that the mortality is distinctly high, being 49.1 per cent. in 24 cases recorded. As Parrot observes, this is a much higher rate than that recorded in other French colonies and shows that Algerian blackwater is far from being negligible.

A. B.

**GASBARRINI (ANTONIO). Studi sulla Malaria. VI. Ricerche su una particolare forma di emoglobinuria sperimentale.—Sperimentale. 1915. Apr. 30. Vol. 69. No. 2. pp. 301-326.**

A continuation of the author's laboratory studies on points connected with malaria. He finds that he is able to produce in dogs and rabbits an experimental haemoglobinuria by injecting into either the peritoneal cavity or the veins, the laked blood of the same animal in quantities proportioned to its weight. If however the laked blood has been subjected to a preliminary heating for three hours at 56° C., this phenomenon does not occur. Like the author's previous contributions, this paper is one for the specialist.

J. B. Nias.

## BOOK REVIEW.

GIMLETTE (John D.), [M.R.C.S., L.R.C.P.]. **Malay Poisons and Charm Cures.**—viii + 127 pp. Crown 8vo. 1915. London: J. A. Churchill, 7, Gt. Marlborough St. [Price 3/6 net.]

This little book, though it is but an introduction to a large subject, contains much that is interesting, not only to the medical jurist and to the pharmacist, but also to the ethnologist and the philosopher.

The first chapter surveys the orbit of the native Malay practitioner. The Malays would seem to be a much bedevilled folk. They live in fear of two kinds of jins—one kind that haunt the firmament and the waters, or go to and fro in the earth like Satan, or ride upon the wings of the wind; and another kind that possess the inward parts of man. It is these latter that are necessarily and specifically associated with the ills that flesh is heir to, although disease in general is sent by God and may be influenced to some extent by jins of the other kind. This being the Malay idea of pathology and nosology, preventive medicine among them is chiefly a matter of amulets and talismans, and therapeutics largely a business of incantations—though not wholly so, since the Malays, like the proletariat of more advanced countries, have great faith in the powerful grace that lies in herbs. As a consequence the native practitioner, or *Bomor*, is not only a sorcerer familiar with all the “breathed spells” that form the appropriate and essential part of the treatment of disease, but also a pharmacist deeply versed in the plants and drugs that constitute the adjuvants and excipients of his ghostly medicaments. These Bomors may be of either sex, but “are generally crafty old men.” There are specialist Bomors having peculiar power over particular orders of jins, and there are Bomors-in-chief (who usually are women) before whom all lesser Bomors are flat and unprofitable, but serious cases of poisoning are recognised as being beyond the efforts of the most potent Bomor. The spells—of which some fine examples are here translated—also vary in intensity; the mildest of them are mere deprecations, beginning with a polite remonstrance and ending in a diplomatic warning; the worst are resounding volleys of execrations that might have made Ancient Pistol cry mercy.

Chapter II treats of “fish” used as poisons by Malays, the term “fish” being used in the popular sense, to include marine animals of other kinds. The author mentions the sting-rays (or “stingarees” as the *Trygonidae* are called in Australia), several species of cat-fishes (*Siluridae*), and the parrot-fishes or globe-fishes of the genus *Tetodon*, the qualities of all of which are also well known in other parts of the world. The cat-fishes, of which the most formidable in Indo-Pacific waters are those of the genus *Plotosus*, can inflict very serious envenomed wounds with the enlarged and serrated ossified-rays of the dorsal and pectoral fins. With the sting-rays the venomous weapon of offence is the great serrated spine (representing a dorsal fin) of the whip-like tail. The author states that a valuable racehorse, which some Kelantan Malays had stabbed with spines taken from a sting-ray, nearly died from the effects of the wounds. Of other marine animals the one most commonly used by Malays is the sea-worm *Chloëia*, the setae of which are irritant.

Chapter III is an interesting medley of other animal products to which the Malays attribute either toxic or therapeutic properties. A good many of them—such as the gall of the many animals specified, the powdered bones of goose, the knee-cap of tiger, the horns of serow and sámbar, the various land-snails, etc.—are like the ingredients of the charm of powerful trouble brewed by the witches in Macbeth. A few, like the Cantharid beetles and urticating hairs of caterpillars, are undoubtedly efficacious.

Chapters IV and V, which relate to vegetable poisons, naturally occupy a large part of the book. The numerous drugs are severally described under their vernacular names, the Linnean name and the reference to the appropriate Natural Order also being given; and the part of the plant used, along with the qualities assigned to it in local estimation, the manner

of its preparation and employment, and the symptoms and effects caused, are all duly considered. These chapters contain much curious information of a discursive sort illustrating manners, customs, criminal propensities, and popular beliefs.

The sixth and last chapter deals with inorganic poisons and their ingenious methods of administration with criminal intent. Powerful poisons like potassium cyanide and arsenic seem to be as easily procurable in the Malay States as they are in other Oriental bazárs.

Three appendices contain, respectively, some Malay charms and spells in romanized vernacular, a classification of poisonous Malay plants by Natural Orders, and a pharmacological list of Kelantan poisons.

The author is to be felicitated equally upon his practical curiosity and industry, and upon his liberal and philosophic outlook; it is not given to every medical man to be able to treat the contraptions and superstitions of the witch-doctor as human tissue worthy of attentive dissection.

A. Alcock.

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## TROPICAL DISEASES BUREAU.

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[No. 3.]

## LEPROSY.

BAYON (H.). **Leprosy: A Perspective of the Results of Experimental Study of the Disease.**—*Ann. Trop. Med. & Parasit.* 1915. Mar. 18. Vol. 9. No. 1. pp. 1-90. With 6 plates.

This important paper gives an excellent and comprehensive resumé of our knowledge of the subject up to date. After a short historical introduction the author discusses the clinical and microscopical characters of the disease and, in an especially full manner, the attempts at the cultivation of the bacillus and its experimental transmission to animals. The questions of its communicability, treatment and prevention are gone into; and a series of beautifully executed plates are given illustrating the author's observations on the cultivation of the bacillus of human and of rat leprosy, and on the transmission of the disease to animals, as well as photographs of "serpiginous" or "lupoid" leprosy, and of the effects of the intradermal injection of a cultural extract in the treatment of leprosy. His conclusions are as follows:—

"Though numerous questions are as yet unanswered in the pathology of leprosy, and many points are still under discussion, it cannot be denied that the researches of the last ten or fifteen years have opened up further fields of fruitful investigation, and helped to elucidate several obscure problems.

"It is true that the results of some experimental observations are so diametrically opposed that it appears hardly possible that both can be correct, at least not in their entirety. This is no new feature in the study of diseases whose investigation presents more than ordinary difficulties, Malaria is a good example. First of all bacteria were isolated time after time from patients, and it was sturdily maintained they were the etiological factors of the disease. Then the protozoa in the erythrocytes were stated to be artefacts by men eminent in various branches of medicine. Later on the plasmodia were found in marsh water and so forth. Finally, the present conclusive standpoint was reached, but the path to truth was strewn with the thorns of controversy and deeply indented with the pitfalls of erroneous deductions.

"This comparison explains the present position of leprosy research. The exercise of sound and reasoned scientific criticism ought to enable us to unravel, in course of time, the delicate and elusive thread of positive fact from the tangled skein of mistaken interpretations of essentially correct, but irrelevant observations.



"The main conclusions which can be deduced from a perspective review of recent experimental study of leprosy appear to be concentrated in the following main points:—

*Cultivation of Hansen's "bacillus."*

"Any micro-organism isolated from lepers which claims to correspond to the acid-fast rod seen in lesions should be identified by injection into animals and the following production of the well-known histological features of lepromas.

"The culture of Kedrowsky and those similar to this type are the only ones to fulfil this essential postulate.

*Clinical features of leprosy.*

"In addition to the nodular, maculo-anaesthetic and mixed types, a further variety is recognisable, with thick raised patches, which may be more or less confluent and circinate, containing numerous giant cells, and very scanty acid-fast rods.

*Histological appearances of typical leprotic lesions.*

"In dermal nodules and corresponding lepromas of inner organs, there occur numerous matted masses of acid-fast rods, intracellularly and extracellularly situated, very slight tissue reaction and scanty giant cells.

"The lesions of inner organs which show caseation, necrosis or numerous giant cells of the Langhans type, appear in some cases to be due to tuberculous complications. Guinea-pig inoculations only can conclusively decide the nature of such appearances.

"Maculae show the features of slight chronic irritation due to the action of minute doses of bacterial toxins. This, in addition to the external resemblance between maculae and the erythema produced by injecting the water soluble contents of various acid-fast cultures into lepers, seems to postulate that leprotic maculae may be the result of a local reaction similar to the one resulting in von Pirquet's and similar tests for tuberculosis.

*Rat leprosy.*

"This spontaneous disease presents numerous points of resemblance to leprosy, and may yet be found to be etiologically related to the human malady.

"Its experimental transmission in rodents only causes analogous but not identical effects to the spontaneous disease.

*Transmission to animals.*

"The negative results of numerous experimental inoculations of human beings, and the relatively low infectivity of leprosy, should prepare us to face very numerous unsuccessful results in dealing with this question. It is only by injecting a large series of animals in various ways, and then observing them for prolonged periods, that deposits of acid-fast 'bacilli' can be produced in the inner organs which have the essential histological features of the leproma.

*Serology.*

"Wassermann's test is incapable of distinguishing in every case syphilis from leprosy. The same applies to Eitner's test. Noguchi's luetin test is negative in lepers whose disease is not complicated by syphilis.

"Leprotic sera often show spontaneous absorption of complement. The serological distinction of leprosy and tuberculosis is not possible in every case. Tuberculine tests may be present in lepers showing no clinical symptoms of tuberculosis.

"Agglutination is so far of little value owing to self-clumping of acid-fast bacteria and low titer of leper sera.

*Contagiousness.*

"The communicability of leprosy by direct and indirect contact, especially under defective hygienic conditions, has been established by numerous repeated and independent clinical observations.

*Treatment.*

"Leprosy, especially the macular variety, is subject to spontaneous remissions and self cures. Chaulmoogra oil is indicated for nodular cases; cultural extract for macular lepers (as far as the present experience goes).

*Prevention.*

"Registration and sanitary inspection of lepers' habitations; segregation in asylums, settlements or colonies; early separation of children from leprous parents; betterment of hygienic conditions where leprosy has spread extensively."

P. S. Abraham.

**RINGENBACH (J.) & GUYOMARCH.** *La Lèpre et le Pian dans les Territoires parcourus par la Section Française de la Mission de délimitation Afrique Equatoriale Française-Cameroun en 1912-1913.*—*Bull. Soc. Path. Exot.* 1915. Mar. Vol. 8. No. 3. pp. 124-130.

*Leprosy.*—Leprosy has been observed all over French Equatorial Africa, and the natives have no fear of its contagion and do not isolate the sufferers. Men and women are equally affected. The authors met with cases scattered and sometimes in small foci, e.g. at Abié seven cases. From the sea to Ivindo there were 25 cases of leprosy in 1,500 individuals examined, from Sangha to Lobaye 24 in 2,250, and from Lobaye to Ouham 2 in 200. Most cases were of the mixed type. The diagnosis was not always easy from syphilitic and phagedenic lesions—careful search of the skin for discoloured and anaesthetic patches and microscopical examination for the bacilli were necessary. At Abié the nasal mucous membrane of only two out of seven cases showed bacilli.

The natives take no precautions against leprosy and have no special treatment for it—they simply cover the sores with their usual mixture of powdered red-wood and palm oil. Nevertheless, the disease does not seem to be at present increasing among the populations of the Congo, where it has existed from remote times. There must be some factor in its propagation with which we are unacquainted; for there is a flagrant contradiction between the complete absence of prophylaxis and its little increase.

P. S. A.

**McCoy (George W.).** *Statistical Study of Leprosy in Hawaii.*—*Treasury Dept. U. S. Public Health Service. Public Health Bull.* No. 66. 1914. Sept. pp. 17-26.

A careful statistical analysis of the lepers of Hawaii up to January 1914. Since 1909 the apprehension and detention of lepers have been conducted under a territorial law. The author observes that "if this law were obeyed, there would be no trouble in having every leper isolated promptly." Since the year 1900, 1,058 lepers have been apprehended, and about half of them were patients between the 11th and 25th years inclusive. Eight were children between one and five and 56 children aged six to ten. About one third of the total number were persons in the second decade of life.

"One of the remarkable facts about leprosy and one for which there is no satisfactory explanation is that the incidence of the disease, practically (C182)"

everywhere, is almost twice as high among males as among females. . . . Association with lepers was admitted in nearly 37 per cent. of all cases, and the presence of the disease in a parent or brother or sister constituted over half of the acknowledged associations."

The statement so frequently made that prolonged and intimate contact with leprosy is needed to bring about infection is certainly not borne out by the facts in Hawaii. Cases are all too frequent in which there is absolutely no history of any association with lepers, and this is true in some cases where the statement of the patient can be verified by reliable collateral evidence. It is notable that association with a leprosy husband or wife occurred in only 28 out of 1,060 cases. One attendant at a leper hospital was affected and Dr. McCoy knows of two other cases in persons who were employed at the settlement. He observes:—

"The length of time that symptoms have existed before the patient comes under the control of the Health Authorities is probably a very important matter in determining the success or failure of segregation. . . . false and misleading answers would often be given. While we are not acquainted with the mode of transmission of the disease and do not know at what time in its course it is infectious, there is no reason for doubting that the early stages are at least as dangerous as the later ones . . . . An early diagnosis of leprosy is often difficult and sometimes impossible."

Out of 1,060 cases where the clinical signs were positive, the microscopical examination for bacilli in 60 was negative.

Table 12 gives the signs of onset in the cases—426 skin and 311 nerve lesions—in which the manifestations were stated with sufficient definiteness. The nodular cases constitute a larger proportion of lepers now than they did in the past in Hawaii.

P. S. A.

**BULLETIN DE L'OFFICE INTERNATIONAL D'HYGIÈNE PUBLIQUE. 1915.**

Jan. Vol. 7. No. 1. pp. 9–18 & Feb. No. 2. pp. 234–254—

**Etude de la Lèpre.** i. By NAZARE-AGA (Ardachir Khan); ii. By PULIDO (Angel); iii. By SERGENT (Edmond) & NÈGRE (L.); iv. By BENTZEN (G. E.); v. By SEIDL (Carlos); vi. By EAGER (J. M.); vii. By RUYSCH (W. P.); viii. By de CAZOTTE (M.).

i. ([Leprosy in Persia.] ARDACHIR KHAN NAZARE-AGA.)

The author gives a short but good account of "tubercular" and "anaesthetic" leprosy. He states that the disease is not endemic in Persia, and that there are only some 80 lepers in the north, in the province of Azerbeïdjan near Mianeh. [This statement is not in accordance with the information hitherto before us, unless it be that there has recently been a marked diminution of the disease both in the lowland and mountains of the country.] He inclines to the contagion theory, and refers to the views of MARCHOUX in connection with the role played by flies in conveying the bacilli, as well as to the observations of NOG in demonstrating acid-fast bacilli in mosquitos.

ii. (Communication sur la lèpre. Par M. le Dr. Angel PULIDO.) [Spain.]

The most recent work on the subject of leprosy in Spain is in Dr. Ph. HAUSER's "*La Geografia Médica de la Península Ibérica.*" From

the statistics of 1878 and 1904 it does not appear that the total number of lepers in 19 provinces of Spain has sensibly altered, although the disease has shown an increase in Alicante, Castille, Valentia, Cordova, Malaga, Grenada and Tarragona, diminution in Corona, Pontevedra, Huelva and Seville, and a disappearance in Albaceta, Avila, Barcelona, Burgos, Lugo, Madrid and Orensa. There is much difference of opinion among medical men in reference to its causation; those in the Eastern Provinces believe in its contagion and recommend isolation, while others, as in Seville, freely admit lepers in the general hospitals and declare that they have never found cases of contagion. In Malaga and Huelva lepers enjoy perfect liberty. In Corona most of the lepers are congregated in the asylum of Santiago where a belief in the heredity of the disease is prevalent. The most recent figures give 117 lepers in Valentia and 176 in Alicante, where a leproserie with isolated pavilions has been established since 1909; 127 lepers have been there received.

In the leproserie at Fontilles "606" has been tried as well as ichthyol, nastine, chaulmoogia, and eucalyptus in intramuscular injections. A more accurate statistical investigation of leprosy in Spain is now in course of preparation.

iii. (Note sur la lèpre en Algérie. Edmond SERGENT and L. NEGRE.)

This paper gives a full historical account of the various observations on leprosy in Algeria since 1839. The most important work on the subject was published by GEMY and L. RAYNAUD in 1897, in which they recorded 58 cases—19 indigenous Mussulmans, 8 Israelites, 24 Spanish, 1 Maltese and 6 French or Italian. RAYNAUD in 1904 added 34 cases and additional ones have been reported by other authors. In twenty years, not more than 140 to 150 have been noted altogether, and the majority have been imported particularly from Spain. There are no indigenous centres of leprosy of importance either among the native Mussulmans or the Israelites, and under the improved sanitary conditions which are being introduced the disease is not likely to spread. The measures recommended are registration of cases, prohibition of certain trades, treatment in hospitals in separate wards, and non-admission to the country of foreign cases.

iv. (La lèpre en Norvège par M. le Dr. G. E. BENZÉN.)

The author gives a resumé of the measures adopted in Norway since the middle of the nineteenth century, when the attention of the authorities was drawn to the wide distribution of the malady in that country. In 1854, a medical inspector was appointed, and 1857 sanitary councils were established. Previous to that date, there were 2,833 known cases, 235 in the hospitals and 2,598 in their own houses. By a law in 1877, necessitous lepers were prevented from begging and as far as possible kept in hospitals or isolated in their homes with separate utensils, linen, etc. These measures were extended by a law in 1885 to non-necessitous cases who, except when married, had either to live separately from their families with separate beds, etc., or be transferred to a hospital.

A table gives the statistics of the total number of lepers in Norway—of those kept in hospitals and of those outside from the year 1856 to 1913. A marked diminution is to be noted since 1869. In that year, there were 787 in the hospitals and 1,820 outside—total 2,607; at the end of 1913, there were 181 interned and 104 in their own homes—total 285.

v. (Exposé sur la lutte contre la lèpre au Brésil par Dr. Carlos SEIDL.)

Leprosy was introduced in Brazil by the Portuguese colonists. It is now common in some parts and rare in others: the states of the Amazon, of Para, Ceara, Pernambuco and Bahia furnish many cases; it is less frequent in Pianhy, Maranhao, Rio Grande do Norte, Parahyba, Alagoas and Sergipe. The most dense centres exist in the States of Minas and St. Paul principally in their bordering zones; the States of Rio de Janeiro and Espirito Santo come next; and it is found in smaller proportion at Goyaz, Matto Grosso, Santa Catharina and Rio Grande do Sul. It has recently increased in the state of Parana. There are no reliable statistics as to the number of lepers in all Brazil—a rough estimate is 10,000. The only prophylactic measure employed is isolation in asylums—of which the most important is at Rio de Janeiro—but isolation at home under medical supervision is permitted. The theory of heredity has lost ground among the medical men in Brazil. In our ignorance of the mode of transmission of the disease—directly, or by medium of inanimate objects, or by intermediate carriers of the bacillus—no scientific prophylaxis can be adopted, but the establishment of leprosy cities, in place of hospitals, is to be recommended.

vi. (Renseignements fournis par M. le Dr. EAGER.) [United States.]

In the United States of America there are three leprosy centres: (1) on the Pacific Coast where the majority of lepers are Asiatics; (2) in Minnesota in the region of the Great Lakes where those affected are of Scandinavian race and (3) on the coast of the Gulf of Mexico, especially in Louisiana, Florida and Texas. An official enquiry in 1902 revealed the existence of 278 cases in the United States. Of these 145 were born in the country, and only 72 were isolated; about two thirds of them had contracted the disease in the States. Another leprosy census, taken in 1909, gave a total of 139 cases—50 in Louisiana, 20 in Florida, 16 in Minnesota and 12 in Texas. In 1912 a further count gave a total of 146 lepers. Many cases no doubt have escaped official registration, but in all probability leprosy is diminishing in the States.

The Reports from the American colonies gives the numbers as follows:—Hawaii 696, Porto Rico 28, the Philippines 2,754 (in a population of over six millions), and Panama 7. Lepers are not allowed by law to enter the United States.

[It is difficult to understand this great drop in the number during such a short period of time—half the total number must have disappeared and no new lepers been introduced in seven years—unless the stringent attention of the authorities, and the general “scare” fostered by the public newspapers resulted in the concealment of many cases.]

## vii. (Renseignements donnés par M. le Dr. W. P. RUYSCHE.) [Holland.]

There are very few lepers in the Netherlands—never more than 20 and all come from the Dutch Indies. There is a kind of leper asylum for them—containing in general from three to ten cases. A fresh enquiry in reference to leprosy is now being made in Holland. At present and since 1865 all cases dangerous to the public health must be registered, and the majority of the Superior Council of Health are in favour of including leprosy in the list. If further investigation demonstrates its active contagion or increase in the country, the Government will establish a leproserie and take such measures as may be requisite.

## viii. (Indications fournies par M. le Dr. de CAZOTTE.) [France and Dependencies.]

This paper shortly refers to the existing regulations against leprosy in France and other countries. In April 1914, the notification of the disease was not obligatory in France, but the question was then under consideration by the Sanitary Administration. In the French colonies isolation was the rule, but not always realisable in practice, as the lepers are frequently hidden by their families and evade internment. Leper asylums have been established in the West Indies for many years—one of them at Désirade since 1728. Within recent times, several of these, as in Guiana (1895) and Guadaloupe (1906), have been reorganised and more stringent measures adopted. Leprosy villages, asylums, etc. have also been lately founded in Tahiti, New Caledonia, the French Indies, Indo-China, etc., Madagascar and West Africa. In Madagascar there are nine lazarettes sheltering 4,000 lepers. In Indo-China the number of lepers is estimated at 4,000 to 5,000 in Tonkin, and 5,000 to 6,000 in Cochin-China.

A short reference is made to the laws relating to leprosy in Canada, Germany, Austria, and other places.

P. S. A.

**BARBÉZIEUX (G.). Note sur la Lèpre tonkinoise. Distribution géographique de la Lèpre au Tonkin.—*Far East. Assoc. Trop. Med. C. R. Trois. Congrès Biennal, Saigon* (1913). 1914. pp. 132-147.**

Leprosy is found at all altitudes in the lowlands, on the coasts, and on the high plateaux, for instance, of Yunnan in China, over 2,000 metres above the sea level, which is a large centre for the disease. It has probably existed in Tonkin from the earliest times, and in the fifteenth century rigorous laws were enforced in connection with it. The author considers that, at present, neither "contagion" nor "heredity" are proved as etiological factors of leprosy, and that the affection most often appears to have been accidentally acquired, in certain conditions of environment, habitat and food, by subjects predisposed. In his opinion the bacillus of HANSEN is far from playing the principal role; and he agrees with TARN of Rio de Janeiro that it is only a pathological complication of leprosy.

In Tonkin the principal centres are along the coasts and in the delta of the Red River. It is rare in the higher regions, where the conditions of hygiene, food, etc., are more favourable. Until recently

but little accurate information was available; at the present time the author estimates the number of lepers in Tonkin at not more than 4,000—in 1912 above 2,000 were officially known. Among 791 cases there were 576 males (73 per cent.), 195 females (25 per cent.), and 20 children under fifteen years old. These figures differ from those found in Yunnan, where in 85 cases 93 per cent. were males.

In reference to age, in 213 cases only 9 under ten years of age showed the disease; it most often made its appearance between the ages of eleven and thirty—in 63 per cent of the cases. As regards the occupation of the lepers, out of 476, 270 were workers in the rice fields, and the next most numerous class were the coolies—like the former, badly fed, and living under unhealthy conditions.

P. S. A.

**BARBÉZIEUX (G.). Le Bacille de la Lèpre dans Quelques Produits Lépreux et ses Rapports de Fréquence avec l'Age de la Lèpre.—**  
*Far East. Assoc. Trop. Med. C. R. Trois. Congrès Biennal, Saigon*  
(1913). 1914. pp. 124–131.

The author observes [as is well known] that the bacillus of HANSEN is not always to be found in every case of undoubted leprosy, and that in some instances it may be demonstrated at one time, but not at another. In 700 cases at the Té-Truong Asylum, Tonkin, the examination for bacilli was positive in the nasal mucous membrane in 328 or 46·85 per cent., in pus in 19·10 per cent., in leproma tissue 22·19 per cent., and in the blood in 2·83 per cent. There seemed to be some relation between the presence of bacilli and the age of the leper—being much more frequent in the young and early cases, than in the old and long standing ones. At the commencement of the disease—within the first years—the bacillus was found in only 25 per cent. of the cases. After the 20th year the organism seemed to disappear.

[As was pointed out by Drs. BOURREL and Le ROY des BARRES in the discussion on this communication the author did not in his statistics distinguish the “nodular” from the “anaesthetic” forms of the disease. In the former the bacilli are usually to be found readily, at any rate at some period, while in the latter they are with difficulty found except in the diseased nerve trunks. His statistics do not conform with those of other observers.]

P. S. A.

**HOSTALRICH. Impressions cliniques sur l'Étiologie de la Lèpre en Pays Annamites.—***Far East. Assoc. Trop. Med. C. R. Trois. Congrès Biennal, Saigon* (1913). 1914. pp. 157–166.

In this paper an endeavour is made to prove that “heredity,” and not “contagion,” is the dominant factor in the etiology of leprosy. The author's observations were made during a period of five years on 68 cases in Annam and Cochin China. He suggests that lepers should be rendered sterile by means of Röntgen rays!

In the ensuing discussion it was pointed out by Dr. CLARAC that “heredity” would not explain the rapid spread of leprosy in New Caledonia—previously free from the disease—after the arrival in the colony of an affected person. Dr. ROTHAMEL, also in opposition to the author's views, alluded to the fact that in 208 cases under his observation only 15 cases had leprosy in the family.

P. S. A.

**ROUSSEAU (Paul).** *Sur la transmission de la lèpre.*—*Bull. Soc. Path. Exot.* 1915. Feb. Vol. 8. No. 2. pp. 57–58.

In the course of a mission to Casamance and Upper Gambia, where leprosy is abundant, the author had the opportunity of studying this question. He does not believe that any stinging agent transmits the disease, but that the contagion, similar to that of tuberculosis, is effected through aerial and gastro-intestinal channels. It is notable that leprosy flourishes particularly in countries where the people blow their noses with their fingers and eat with their hands. Nasal mucus with bacilli may thus be carried to the common food bowl and the affection passed on to others. The author intends to experiment with apes upon these lines.

P. S. A.

**HOPKINS (Ralph).** *Medical Aspects of Leprosy.*—*New Orleans Med. & Surg. Jl.* 1915. June. Vol. 67. No. 12. pp. 1015–1020.

Up to the present, 240 cases have been admitted to the Lepers' Home in Louisiana—78 being females and 162 males. About 20 per cent. have near leprous relatives—but no husband or wife has contracted it from a wife or husband. Many new cases in the incipient stage are being admitted in the Home and this indicates that the disease is spreading in Louisiana. Instances are given of periods of incubation of six years and eight years. Two cases of lepra fever were fatal. About 6 per cent. of the patients have become insane. As regards treatment the best results have been with increasing doses of chaulmoogra oil in connection with strychnine and hot baths, and eleven cases have been discharged as cured—i.e., with no clinical evidence of the disease and no acid-fast organisms at the site of previous lesions or in the nasal secretions.

P. S. A.

**MATAS (Rudolph).** *The Surgical Aspects of Leprosy.*—*New Orleans Med. & Surg. Jl.* 1915. June. Vol. 67. No. 12. pp. 1020–1025.

This paper especially alludes to the surgical results of Drs. GOODHUE and McVEIGH who, with an experience of 6,000 surgical operations in the course of ten years at Molokai, have come to the conclusion that not only excellent results may be obtained by surgery in the amelioration of the disease, but that in an early stage the complaint may be eradicated by careful surgical interference or by the judicious application of suitable topical remedies to the primarily localised lesions.

P. S. A.

**MCCOY (George W.).** *Notes on Leprosy based on Experience at the Molokai Settlement.*—*Military Surgeon.* 1915. May. Vol. 36. No. 5. pp. 413–417.

*Causes of deaths among lepers.* Contrary to the general impression that leprosy is not directly a common cause of death, the Reports from Molokai show that the disease is itself responsible for about 75 per cent. of the deaths at the Settlement. In a total of 339 deaths during a period of five years, 243 were directly due to the disease and 96 to other causes. Pulmonary tuberculosis is relatively uncommon, causing only 3 per cent. of the deaths.



*Prevalence of glandular tubercular infection.* When submitted to guinea-pig inoculation tests, it was shown that practically all cases of necrosis of lymph glands were due to infection with *B. tuberculosis*. This frequently developed among the adults, and the axillary and inguinal glands were chiefly affected.

*Unusual case of leprous fever.* A Hawaiian boy of thirteen, with leprosy of mixed type of two years' duration, rapidly developed pyrexia with a copious generalised measles-like eruption—the papules exhibiting numerous acid-fast bacilli, which were also found in the blood. Death ensued in ten days.

*Cholesterin-bearing lesions.* Cholesterin crystals in large amount were found in two cases; in the one in hydrocele fluid from a Chinese mixed leper; in the other in purulent contents from a cyst of a neural leper.

*Unusual skin lesions.* In two cases smooth, elevated, reddish papules averaging 2 or 3 mm. in diameter and resembling smallpox, were extensively distributed in the one, and confined to the back in the other. Acid-fast bacilli were abundantly found in the lesions.

*Therapeutic efforts.—Vaccines.* Thirty cases at the Leprosy Investigation Station had been under "Vaccine" treatment—in several for two years. Live as well as dead cultures were used. Pronounced constitutional symptoms sometimes occurred, but "an impartial observer would probably have held that the disease had not been influenced in any decided manner."

*Chaulmoogra oil.* The author's experience confirms the general view that it is of some benefit in leprosy. He had had several cases under treatment by injection.

*Carbon dioxide snow.* For skin lesions in leprosy applications at intervals of a week or ten days are sometimes very satisfactory.

*Type of cases in regard to segregation.* In the author's opinion, lepers of the nerve type, in which bacilli cannot be demonstrated in skin lesions or nasal secretions, and in which ulcerations do not exist, may properly be placed on "parole"—without risk to the community—on the following conditions:—(1) Report to a physician for examination at least once in six months. (2) Not to engage in preparation of food, or serving same, for other persons. (3) To have separate bedding and table utensils. (4) Not to live in the same house with children under sixteen years of age.

P. S. A.

**GWYTHYR (A.). Is there a Primary Lesion in Leprosy?—*Indian Med. Gaz.* 1915. Feb. Vol. 50. No. 2. pp. 41-47.**

The author, with the view to discover whether there may not be earlier manifestations of the disease than those generally recognised, carefully analysed the notes taken by Drs. A. and E. NEVE at the State Leper Asylum at Srinagar of over 500 cases between the years 1891 and 1914. He arrives at the following conclusions:—

"1. That there is in leprosy a primary lesion which appears some considerable time before the generally accepted manifestations of the disease, but is unfortunately so small and insignificant as to have been up to now overlooked.

"2. That this primary lesion usually takes the form of a patch of anaesthesia, or small blister, or the two combined.

" 3. That it occurs most frequently in those parts of the body which are from anatomical reasons most exposed to injury.

" 4. That there is a definite period of time between it and any secondary manifestation, varying with the type of the disease.

" 5. That there are in many cases distinct rigors—which are peculiar in being unaccompanied by rise in temperature—between the primary and secondary manifestations.

" 6. That the secondary manifestations appear either rapidly, or slowly and gradually, according to the type of the disease."

Several points of interest in reference to aetiology are brought out in the paper. Out of 240 males, in 167 cases or nearly 70 per cent., the patient was the only leper in the family or in the village, and only in 49 cases were there other lepers in the patient's family. In 23 female cases, on the other hand, 18 had other members of the family affected. The author notes " that leprosy is far less common in females than in males, the proportion here being one female to ten males." Of 178 wives who had lived with their leper husbands for periods of from 3 to 27 years, 174 were healthy. Nine leper women had healthy husbands to whom they bore healthy children. One hundred and forty-three parents, one being a leper, were responsible for 350 healthy children; in only two cases was a child diseased. Of nine children, both of whose parents were lepers, six became diseased. [Other figures of interest in this connection are to be found in this *Bulletin*, Vol. 3, p. 188 (McCoy & GOODHUE; BAYON).]

At the Kashmir State Leper Asylum none of the staff or their families or any of the dressers and servants have become affected with the disease except in one instance of a dresser at Sabathu Asylum, whose brother and sister and a number of people in his village were lepers, and another of a servant who also had leprosy in his family and in his village. In no case at this Asylum had a leper's wife become infected, and in the course of the last 20 years no child had become leprous who had been born in the Asylum or who had been admitted free from the disease.

As regards the source of infection, the author discards (1) the food theory—either from a fish diet, or from eating and drinking together, (2) contagion, (3) infection by insect bites, and (4) infection through the nares—leprous rhinitis not being an early manifestation. He believes that the disease is one of locality—*i.e.*, " that there must be local conditions of soil, water, or whatever the factor may be, which favours the intensification of the virulence of the disease, or else that there is a missing cycle in the life history of the causative organism which local conditions favour. It is possible that the causative agent of the primary lesion is of the nature of a streptothrix, and that the acid-fast types found in the secondary stages, or the developed disease . . . may after all prove to be a sporular development."

P. S. A.

HONEIJ (James A.). **A Study of Leprosy: With Especial Reference to the Pulse and Temperature.**—*Boston Med. & Surg. J.* 1915. Apr. 22. Vol. 172. No. 16. pp. 580–584. With 3 charts; Apr. 29. No. 17. pp. 629–638. With 11 charts; May 6. No. 18. pp. 668–672. With 1 chart.

A study of the temperature and pulse of seventeen patients in the Penikese Hospital who had been under observation for various periods

during two years. Fourteen having been under constant observation for 18 months, gave the following results :—

1. There occur a definite clinical temperature and pulse curve diagnostic and prognostic of leprosy.

2. There is a frequent and persistent occurrence of a high morning pulse rate—"morning pulse"—in all cases.

3. A constant high pulse rate is most marked in progressive and advanced cases.

4. A persistent high pulse rate without a corresponding elevation of temperature of prolonged duration is found after "toxic-febrile" attacks.

5. There is a correlation of temperature and pulse in early cases, in contrast to a gradual increase of pulse rate without similar temperature reactions in progressive and advanced cases.

6. Not uncommonly a low evening temperature is present.

7. A marked irregularity in temperature and pulse exists during complications not associated with leprosy.

8. There are typical "toxic-febrile" temperatures and pulse curve reactions.

9. Marked temperature and pulse reactions occur from otherwise insignificant cases, both physical and mental.

P. S. A.

**BARBÉZIEUX (G.). Les Troubles de la Menstruation chez les Femmes Lépreuses.**—*Far East. Assoc. Trop. Med. C. R. Trois. Congrès Biennal, Saigon* (1913). 1914. pp. 147-157.

Observations were made on 99 female lepers in the Tê-Truong Asylum. Of 38 cases which were attacked with the disease before menstruation was established in 91 per cent. the latter was retarded; in none of them, however, was it completely abolished—leprous ovaritis being, in the author's opinion, much less frequent than is generally supposed. In 61 cases in which the disease appeared subsequently to the onset of menstruation no menstrual trouble was observed.

P. S. A.

**FAMBRI (Helene). Pathologisch-anatomische Beobachtungen über einen Fall von Lepra universalis.**—*Virchow's Archiv f. Patholog. Anat. u. Physiol.* 1914. Dec. 31. Vol. 218. No. 3. pp. 272-299.

This lengthy paper is based upon a case of leprosy in a girl who died, aged fourteen, in Venice. She and her sister had been taken to Brazil when quite young, and both developed leprosy when about seven years old. Elaborate details of the post mortem are given and an account of inoculation experiments on rabbits with an extensive bibliography. The lungs had the appearance of tuberculosis with thickened nodules and purulent cavities, the contents producing tubercle in rabbits. The main conclusion was that both Hansen's and Koch's bacilli may be associated in the same case.

P. S. A.

**MAXWELL (J. Preston).** **The Treatment of Leprosy by Williams' Leprolin.**—*Far East. Assoc. Trop. Med. C. R. Trois. Congrès Biennal, Saigon* (1913). 1914. pp. 181-184.

The experiments were commenced in April 1912 and 15 male patients have been under treatment. The injections were given weekly at first, and then every fortnight—the results are given up to June 1913. The dose given was 5 cc.; if this amount were exceeded, ulcerations of lepromata and sometimes oedema of the legs were caused. In some cases, a rise of temperature of .5 to 1° was recorded. In five cases, the results were good—"far in advance of anything the writer had seen in 15 years' practice, and in two cases at least a "marked" leprosy became a "doubtful" leprosy. It is too early to speak of a cure, and in two cases [long standing] that gave the remedy a fair trial the disease has undoubtedly progressed.

The writer is continuing the treatment.

P. S. A.

**MALEGIN.** [Report on the Treatment of Leprosy with Dr. Carl Spengler's "I. K. lepra" at the Nicolagewsk Leprosy Colony, Siberia.—Abstract of MS. sent to the Editor. (P.S.A.).]

Dr. Malegin has been in charge of the colony since 1913, and during the past year he has witnessed the "cure" of six cases of leprosy and the decided improvement of several others through the use of SPENGLER's "I.K. lepra." By "cure" he means that all external symptoms of the disease had disappeared. Dr. PODKATOFF had commenced the treatment in October 1909 and the injections were continued off and on until 1912 with good results. A trial of salvarsan had deplorable results; some of the patients died and in others the disease was aggravated. When Dr. Malegin took charge of the colony he was entreated by the patients to continue the I.K. lepra injections. He began with 30 cases in October 1912, but for lack of material he could only finish the series of injections in 14 of them. In early cases the effect was striking—pigmentation, swelling and ulceration disappeared and the general condition greatly improved. Six of them have been discharged after examination by the Sanitary Officer of the district. All the cases except two had been at the same time taking *Oleum gyno-cardii*—but Dr. Malegin ascribes the good results to the I.K. treatment.

P. S. A.

**FEDERATED MALAY STATES.** **Thirteenth Annual Report of the Institute for Medical Research, Kuala Lumpur, 1913.**—73 pp. With 3 plates. 1914. Kuala Lumpur: Printed at the Federated Malay States Government Printing Office. [Leprosy pp. 7-25.]

Tubes of blood media inoculated with leper material and incubated at 37° C. have now been under observation for two years and no culture of the *Bacillus leprae* has been obtained. A large number of experiments were made with other media: serum-agar, ascito-agar, Clegg's media, with amoebae and cholera vibrios, and numerous sub-cultures. Acid-fast bacilli were only present in subcultures prepared with nodules of tissue, but not in those prepared from emulsions. "Thus by following in detail the directions given by CLEGG we have failed to obtain a culture of the leprosy bacillus. As has been observed in every one of our experiments, there was persistence but no evidence of proliferation."

As the leprosy bacilli are contained in connective tissue, it was considered possible that cultivation of leprous tissue by CARREL's method might solve the problem, but the results were negative.

Experiments on animals—rabbits, guinea-pigs, rats, fowls and a monkey gave no positive results. Acid-fast bacilli were subsequently found only in the situation occupied by the remains of the inoculated nodule.

A number of healthy rabbits taken from the enclosure in which the inoculated rabbits were kept, showed acid-fast organisms in their conjunctival sacs. The presence of these organisms, however, appeared to be temporary, and attempts to cultivate them failed.

P. S. A.

**FRASER (Henry) & FLETCHER (William).** *Leprosy and Kedrowsky's Bacillus.*—*Lancet*. 1915. July 3. pp. 13-16.

"Many workers have announced their success in cultivating the leprosy bacillus, but as a rule the methods adopted have but little similarity and their success lacks confirmation. For this reason the work of KEDROWSKY calls for special consideration because BAYON claims to have confirmed its accuracy." The authors refer to their own unsuccessful results, and still believe that they have demonstrated the fallacious characters of the various attempts. KEDROWSKY's and BAYON's work is here critically discussed, and further experiments with material sent by KEDROWSKY and BAYON and with their media have confirmed the authors' view. They maintain that "if the organism is pathogenic in animals then the inoculation of moderately small amounts of the culture should produce lesions, though after longer intervals it may be, than are required for their production by large amounts. The fact that they can only be produced by massive injections suggests that these are caused by the large amounts and not by any inherent pathogenicity of the organism." As regards KEDROWSKY's culture it appears that lesions in animals can be produced by injecting the dead as well as the living organisms and the authors describe experiments which show that similar lesions can be produced by dead or living cultures of other acid-fast bacilli like *B. phlei*, *B. smegmæ* and Rabinowitsch's bacillus. They conclude that there is no evidence that the acid-fast bacillus of KEDROWSKY is the leprosy bacillus.

P. S. A.

**DUVAL (Charles W.).** *Pertinent Remarks upon the Bacteriology and Pathology of Leprosy.*—*New Orleans Med. & Surg. Jl.* 1915. June. Vol. 67. No. 12. pp. 1009-1015.

In the author's view, it is not only possible but highly probable that insects of the blood-sucking species act as the means of transfer of the bacillus of leprosy, and that "the determining factor in leprosy infection is hypersensitiveness, a condition established in the human host accidentally." This condition he maintains is due to a primary inoculation, and that a second inoculation in the sensitised subject is necessary for infection. He further believes that the subcutaneous abscesses which occasionally develop in leprosy are the result of tissue autolysis, and that the leper fever is due to the absorption of tissue

cell products rather than to any toxin elaborated by the Hansen bacilli. His recent experimental work supports HANSEN's view that *B. leprae* is strictly an intra-cellular parasite and that it has a selective affinity for the endothelial leucocyte.

P. S. A.

McCoy (George W.). **The Cultivation of Acid-fast Bacilli from Lepers by the use of Symbiotic Organisms.**—*Treasury Dept. U.S. Public Health Service. Public Health Bull.* No. 66. 1914. Sept. pp. 11-15.

"The method of growing acid-fast bacilli from leprous tissues in the presence of amoebas and bacteria was devised by Clegg (1909), whose results have been confirmed by Currie, Brinckerhoff, Hollman and Duval." The latter found that amoebas and cholera vibrios were not essential, and that contaminating bacteria naturally present in leprous tissues will bring about the conditions necessary for the growth of the acid-fast organisms. The author obtained 83 specimens from 52 lepers—64 from nodular, 18 from mixed cases and 1 from an anaesthetic—and secured pure cultures from 11 of these specimens. Forty-six of them were ulcerated nodules or other lesions in which other organisms were found along with the acid fast bacilli, and these yielded 8 out of 11 successful cultures. "This might be regarded as evidence that the acid-fasts we have isolated from these cases were adventitious organisms which found the conditions of the ulcerating lesions suitable for growth. This possibility cannot be excluded."

Tubes of amoeba agar were inoculated with fragments of the tissue, incubated at 37° C. for about a week, and ten days afterwards examined and transplants made. It was useless to make transplants unless the coccoid forms of the acid-fast bacilli were present.

Subsequent transplants did not always show growth, and sometimes cultures of acid-fast organisms appeared to be thriving to the fourth or fifth generation when they disappeared. Pure cultures were secured in about two months in each of five cases when the culture was in the seventh or eighth generation, one in four and a half months in the fourteenth generation, and one in eight months in the ninth generation.

"It has happened on a number of occasions that what was thought to be a pure culture of an acid-fast organism on amoeba agar, when transferred to plain or glycerine agar gave a growth that would be free or almost free of acid-fasts. . . . The non-acid fasts are the same size and shape as the acid-fasts and like the latter are gram-positive. When a transfer from plain or glycerine agar to amoeba agar is made we again secure what is apparently a pure acid-fast."

The author was unable to produce leprosy-like lesions in mice, rats, rabbits, guinea-pigs and monkeys (Rhesus) with any of these cultures, although the autopsies have demonstrated a wide distribution of the organisms. Only two of the cultures agglutinated with the serum from lepers and then with only a small proportion of the sera used.

"Whether the organisms we have isolated are the true leprosy bacilli or not is impossible to determine at present. . . . If it is not the causative agent of the disease, it is remarkable that it should have been isolated so frequently and under such different conditions by various workers. As a

result of control work with non-leprous tissue we feel certain that these cultures do not represent extraneous contaminations, i.e., these acid-fast organisms were in the tissue secured from leper patients."

The author states that on one occasion he secured a growth of tubercle bacilli (human) on the cholera-amoeba medium as far as the fifth generation.

He sums up his observations as follows :—

"Pure cultures of acid-fast organisms have been secured from 11 of 83 specimens of leprous tissue submitted to cultivation in the presence of symbiotic organisms.

"The cultures were obtained with about equal facility whether amoebas were present or not, and in two instances when contaminations were present in the tissues no added symbiont was required.

"There is a large element of chance in cultivating acid-fasts by the symbiont method.

"The organisms isolated are incapable of producing leprosy-like lesions in laboratory animals.

"Tubercle bacilli will multiply on amoeba agar in the presence of cholera vibrios and amoebas."

P. S. A.

JOHNSTON (John A.). **A Contribution to the Bacteriology of Leprosy.**

—*Philippine Jl. Sci.* Sect. B. Trop. Med. 1914. June. Vol. 9.

No. 3. pp. 227–230. With 1 plate.

The author, referring to the fact that branched hyphae-like filaments are often seen in cultivations of tubercle bacilli and especially to the observations of JORDAN and FOULERTON, and considering the close relationship of leprosy and tuberculosis, believes that Hansen's bacillus, like that of tubercle, is a stage in the development of a streptothrix. From the spleens of two lepers he succeeded in cultivating non-acid-fast streptothrices apparently identical. In one culture there was a tendency for the filaments to break up into coccoid and rod-like forms which were at first non-acid-fast. In six or seven months a few were noted as retaining the fuchsin slightly, and after a year scattered clumps of distinctly acid-fast bacilli were found as isolated individuals and rods still enclosed in the parent hyphae. In February 1913 a number of guinea-pigs and rabbits were inoculated with 48 hour cultures of the streptothrix. One guinea-pig dying in September showed a few scattered nodules in the enlarged liver. Smears from these nodules exhibited no organisms but many distinctly acid-fast rounded masses, three to six microns in diameter. Cultures in placental agar showed a whitish growth in nine days, of acid-fast long and short rods. Growth in bouillon was slow and the bacillary forms showed a tendency to lose the acid-fast property. Further inoculations were made and the experiments are still being continued. The author is so far convinced that the *Bacillus leprae* is but the acid-fast stage of a markedly pleomorphic streptothrix.

P. S. A.

**VERROTTI (G.).** Inoculazione di Emulsione di Leproma (Intracardiaca e Sottocutanea) in una Scimmia Inferiore (*Cercopithecus*); Produzione di un Nodo Primario Sottocutaneo nel Braccio Sinistro (Sede di Inoculazione) e Successiva Produzione di Noduli Secondari nell' Antibraccio destro. [Inoculation of Leprosy Emulsion into one of the Lower Apes, with Production of a Primary Nodule in the Left Arm and Secondary Ones in the Right Fore-Arm.]—*Giorn. Ital. d. Malat. Ven. e d. Pelle.* 1914. Oct. 27. Vol. 55. Anno 49. Pt. 5. pp. 822-835. With 6 figs.

The author had found by preliminary experiments with rabbits that a positive Wassermann reaction can be obtained by repeated injections of leprosy material, and that when such a reaction is established growths can be obtained at the seat of local inoculations. In the present paper he describes the result of further experiments conducted on the same lines with an ape (*Cercopithecus*? sp.). The animal received first of all an injection of 2 cc. of an emulsion of leprosy material into the circulation by means of heart puncture with a syringe, and three weeks afterwards 0.5 cc. of similar leprosy emulsion was injected into the subcutaneous tissue of each fore-arm. After the lapse of fifteen days a swelling of the size of an almond appeared at the seat of each injection, and the skin of both arms began to ulcerate. Three months after the date of the injection both nodules were excised and were submitted to microscopical examination. The sections showed well-stained leprosy bacilli embedded in granulomatous tissue. The Wassermann reaction at this period was variable, being sometimes positive and sometimes negative. At the end of seven months from the date of the first injection, the ulcerations on the arms had completely healed, but several nodules of the size of a pea then appeared on the head and thighs and buttocks. These in turn disappeared at the end of another month. Some of them were submitted to microscopical examination, but leprosy bacilli could not be detected.

The animal having recovered from all the lesions, an interval of four months was allowed to elapse, and then the inoculations were repeated. Two cc. of leprosy emulsion were injected into the heart as before, and simultaneously another two cc. into the left arm. Two and a half months after this second injection a nodule appeared at the seat of inoculation in the arm, and a fortnight afterwards a similar one on the right wrist. There also appeared seven papular eminences on the skin of the right arm, accompanied by an irregular area of skin ulceration. The secondary nodule was excised, and part was used for histological purposes, while the remainder was emulsified with salt solution and injected into another ape. In the part examined microscopically a scanty number of leprosy bacilli were found. The result of the inoculation into the second ape is not stated.

The author thinks that this method of preliminary systemic infection, followed by local inoculation, will yield very satisfactory results.

J. B. N.

**CLEGG (Moses T.), MCCOY (George W.) & HOLLMANN (Harry T.).** Immunity Studies in Leprosy.—*Treasury Dept. U. S. Public Health Service. Public Health Bull.* No. 66. 1914. Sept. pp. 3-10.

The authors employed a number of cultures of acid-fast organisms isolated from leprosy tissue, both by Clegg's symbiont method and by (C182)



Duval's modification thereof, for agglutination tests with serum from lepers who had not had vaccine or other biological treatment. They found that as a general rule the results were negative. They consider that this fact does not invalidate the cultures as those of Hansen's bacillus for the following reasons:—(1) We know that not every bacterial strain is agglutinated by the corresponding antiserum, and it may be that only an occasional leprosy culture exhibits this susceptibility. (2) The leprosy bacillus in the human body may be in such relation to the tissue fluids that ordinarily agglutinins are not produced. (3) The organism may through its fatty or waxy content, or in some other manner, protect itself from the action of body cells and fluids.

In a series of experiments "patients (lepers) who were inoculated with acid-fast organisms isolated from lepers, produced considerable amounts of agglutinin for acid-fast organisms. We believe that non-leprous persons would have reacted in the same manner."

A number of experiments were made for the purpose of ascertaining which of the bacteriological methods, agglutination, precipitin reaction, or complement deflection, was the most satisfactory for differentiating acid-fast organisms. The results showed that the agglutination test gave more satisfactory and specific results than either of the others.

The authors found that after having been saturated with chloroform the organisms gave serum results similar to those of untreated organisms. Experiments were made to ascertain the complement content of the fresh serum of lepers, and several tables to illustrate this and other points are given in the paper. The summary of their results is as follows:—

"The serum of but few lepers agglutinates any of the acid-fast cultures we have isolated from lepers, and then only with a small proportion of the cultures.

"Lepers injected with acid-fast organisms isolated from leprous tissues develop specific agglutinins in the majority of instances."

"Agglutination methods afford means of making group classification of the majority of acid-fast organisms and extracting the fat from the organisms does not make the reactions more specific.

"Immunization of animals (rabbits) with leprous material does not yield agglutinins for any of the acid-fast cultures at our disposal.

"Serum from lepers contains the normal amount of complement.

"Serum from lepers binds complement in the presence of nodular antigen, but the reaction is not specific."

P. S. A.

MATHIS (C.) & BAUJEAN (R.). *La Réaction de Wassermann dans la lèpre.*—*Bull. Soc. Path. Exot.* 1915. May. Vol. 8. No. 5. pp. 252-257.

The authors observe that since 1906 numerous investigations have been published on the subject, and that most of them show that Wassermann's reaction is often positive in lepers. Employing, however, the technique of CALMETTE and MASSOL as used at the Pasteur Institute at Lille in 41 cases of leprosy at Tonkin they obtained 40 distinctly negative results; in one positive case, syphilis was also present with the leprosy. Contrary therefore, to the general opinion, the Wassermann reaction (as carried out by the above technique) is always negative in leprosy. A copious bibliography is appended and particulars of the 41 cases examined.

P. S. A.

**JEANSELME (E.) & VERNES (A.). Réaction de Wassermann et Réaction d'Eitner chez les syphilitiques et les lépreux.**—*Bull. Soc. Path. Exot.* 1915. May. Vol. 8. No. 5. pp. 259–260.

In 1912 Jeanselme gave the results of Wassermann's reaction in lepers and Eitner's reaction in syphilitics (The antigen was prepared from a leproma full of Hansen's bacillus). Positive reactions were obtained in both series. At the present time Eitner's reaction is of no use in establishing the diagnosis between syphilis and leprosy; but Wassermann's, done in series and during treatment with arsenobenzol, is of service as it then becomes negative in syphilis and may remain positive in lepers.

P. S. A.

**GELPI (Paul). Sanitary Control of Leprosy.**—*New Orleans Med. & Surg. J.* 1915. June. Vol. 67. No. 12. pp. 1005–1009.

The author considers that the salutary effects of isolation of lepers have repeatedly been demonstrated, but admits that it presents a complex problem. Legislation is the first condition necessary for prophylaxis and since 1883 notification of cases has been required in New Orleans. Further Acts have since been passed in Louisiana (1892, 1894, 1900) for the isolation and treatment of lepers. The mere enacting of laws is not sufficient to control leprosy; the assistance of the medical profession must be enlisted and the public educated to the necessity of active cooperation. Early report of cases would not only diminish infection but would also increase the chance of recovery, for Drs. Isadore DYER and Ralph HOPKINS have reported several cures. In the author's opinion, anaesthetic cases, which may be considered only feebly contagious, might be treated at home and not confined in an institution unless bacteriological findings justify it.

Accurate figures as to the number of cases cannot be procured. There are now 104 cases in the Home in Iberville parish; the disease appears to be on the increase.

P. S. A.

## TROPICAL DISEASES OF THE SKIN.

BREINL (A.). On the Occurrence and Prevalence of Diseases in British New Guinea.—*Ann. Trop. Med. & Parasit.* 1915. June 30. Vol. 9. No. 2. pp. 285-334. With 8 plates and 1 map.

This paper embodies the results of two journeys to the coastal belt of British New Guinea in 1912 and 1913. In addition to malaria, filariasis and elephantiasis, various types of ulcers, "juxta-articular nodules," gangosa, yaws, and several skin diseases—mainly *Tinea imbricata*, were encountered in most of the villages visited.

*Leprosy* was found endemic only in three places—the Trobriand Islands, the Makeo District on the St. Joseph River in the Central Division, and in one district of the Gulf Division. Altogether 18 cases were diagnosed. The three types of the disease were found; the special native name for leprosy is "Kai-gwa -guia." It is not very prevalent in New Guinea.

"*Juxta-articular nodules*," first described by MacGREGOR in 1901 in New Guinea, has since been found in Java, Siam, Algeria, Senegambia, Madagascar and New Caledonia. The author gives a good account of this disease and bibliographical references. Bacteriological examination of a case did not show "*Discomyces carougeau*" as found by FONTOYNONT and CAROUGEAU in early nodules in Madagascar. Yaws is widely distributed, the majority of cases being in children.

*Syphilis* does not seem to have been extensively spread among the natives and was only found in districts where natives had been in contact with Europeans.

*Tropical sloughing phagedaena*, *Ulcus tropicum*. As the author observes, a great variety of sores have been included under the name of "Tropical ulcer," and it is probable that many of them are caused through secondary contamination of small or large injuries of the skin, and not all due to one specific organism. They are common in New Guinea, especially in villages built on swampy, muddy ground, standing in some relation to the incidence of mangrove mud. Histological examination of granulation tissue from ten cases, agreed with the results of KEYSSELTZ and MAYER and of WOLBACH and TODD, showing abundant spirochaetes (*Sp. Schaudinii* Prowazek). [The author does not mention the "Leishman-Donovan bodies" which most of us have found in "Tropical Sores."]

"*Contracting Sore*." A special type of ulcer was met with in New Guinea, healing up with formation of dense scar tissue, leading to contraction of joints, and mostly occurring in young persons. Spirochaetes were found only in the deep rete mucosum of the skin; the granulation tissue did not differ materially from that of the ordinary tropical sore.

"*Ulcus interdigitale destruens*." Cases resembling the *ulcus interdigitale* of CASTELLANI and CHALMERS, but differing in their copious discharge and tendency to lead to destruction of the affected toes, were widely distributed in the districts west of Orokolo, and chiefly affecting men.

Gangosa was endemic in most of the coastal districts.

*Skin diseases*. In addition to the prevalent *Tinea imbricata*, a few cases of leucoderma were seen, and two cases of true albinism.

A peculiar acneiform affection, leading to destruction and peculiar scar formation was met with throughout British New Guinea. The nose and sometimes the upper lips, cheeks and forehead were covered with pustules, yielding sebaceous matter. Here and there were small patches of smooth scar tissue and depressions with reddish looking fundus. The disease showed a tendency to destroy the affected parts and in two out of eight cases the soft palate and uvula had been destroyed. It seemed very chronic.

There are appended 33 excellent photographs of the various ulcers and affections described in the paper.

P. S. Abraham.

**WISE (Fred). The United States of Colombia a Fertile Field of Research for the Dermatologist.** [Correspondence].—*Jl. Cutan. Dis. including Syph.* 1914. Dec. Vol. 32. No. 12. [Whole No. 387.] pp. 857-859.

In the course of a short sojourn in Colombia, South America, Dr. Wise met with many tropical diseases of the skin—leprosy, elephantiasis, yaws, gangosa, caraate or pinta, sandfly-eruptions, etc., and piedra, which especially affects the scalp and hair of the native Indians. He saw four cases of what he believed to be Madura foot. At Santa Marta, a great banana port, caraate or pinta was very common. Of this disease he observed three types quite dissimilar in clinical appearances:—(1) the leucodermic or vitiligid type, (2) the polychrome type, and (3) the pityriasic type. The first was the most common, the third was chiefly seen in children. He doubts whether these very divergent types should be included in the one common name of "caraate," and whether they are not caused by different varieties of fungi. He considers the fact noteworthy that while most of the bananas coming from tropical America are handled by labourers affected with the disease, the condition seems to be unknown in the United States and Europe to which the bananas are shipped.

P. S. A.

**CHALMERS (Albert J.) & O'CONNOR (A. P.). Pyosis Corletti in British Soldiers.**—*Jl. Trop. Med. & Hyg.* 1915. Apr. 1. Vol. 18. No. 7. pp. 73-78. With 1 plate.

The author, after referring to the various bullous eruptions recorded in the Tropics by MANSON, CORLETT, CANTLIE, CHRISTY, CASTOR, BERTARELLI and PARANHOS, and MacDONALD, gives an account of an epidemic of bullae occurring among English soldiers in Khartoum. They consider it identical with CORLETT's "Impetigo contagiosa bullosa" as described by him in American soldiers in Florida, and probably with the cases of bullous impetigo found by SINGH in India, and by CASTOR under the name "Pemphigus contagiosa" in Burma. It can be easily differentiated from the common Impetigo contagiosa by the absence of crusty lesions as a rule, and by the fact that no streptococci can be found; from Pemphigus acutus from the absence of severe constitutional disturbance and of Demme's micrococcus; from Dermatitis bullosa plantaris by not attacking the soles of the

feet or between the toes (as so far recorded) and by the absence of streptococci and *Epidermophyton cruris*; and from Pyosis mansoni ("Pemphigus contagiosus" of MANSON) by the fact that it does not primarily or to any great extent attack the axillae and scrotocrural regions, that the bullae are large and not surrounded by an inflammatory halo, and are not associated with prickly heat.

It resembles CORLETT'S "Impetigo contagiosa bullosa" in the initial lesions being small reddish spots, appearing without fever or marked itching, in the bullae arising from apparently sound skin, and later becoming flaccid and spreading peripherally—and light friable crusts or scales may form. The eruption may commence on the head and spread to the axilla and more extensively over the body and limbs. [The accompanying photograph shows the thigh of a patient densely covered with the bullae.] On microscopical examination diplococci were always found and extensive and elaborate series of cultivation experiments and bacteriological reactions lead the authors to identify the organism with DYAR'S "*Aurococcus mollis*."

In order to bring the nomenclature into line with that of MANSON'S eruption and to prevent confusion with true pemphigus, to which it is not allied, and with true impetigo, with which it is closely allied, the author proposes the name "Pyosis Corletti" for the affection.

With regard to treatment the authors recommend an autogenous vaccine combined with local antiseptic therapy—cure being rapid. Isolation and prompt treatment will quickly stop an epidemic.

P. S. A.

CHALMERS (Albert J.) & MARSHALL (Alexander). **Tinea capitis tropicalis in an Egyptian Soldier caused by *Trichophyton discoides* Sabouraud 1909.**—*Jl. Trop. Med. & Hyg.* 1915. Mar. 1. Vol. 18. No. 5. pp. 49–55. With 2 plates and 1 diagram.

In this valuable paper the authors record for the first time the occurrence of this fungus in the tropics, and give a full historical account of the faviform trichophytions, with photographs of the scalp and of the cultivations, and microscopical observations which they had made in the case of a young Egyptian soldier who was affected with the disease. The principal diagnostic points are (1) the presence of an area of inflamed swollen skin which pits on pressure with an exudate coagulating into yellow masses and matting the hair together; (2) the hairs remain relatively long and are not brittle; (3) on removal, the hair is seen surrounded by a white sheath and on microscopical and cultural examination is found to be infected with *T. discoides*. From favus it is easily differentiated by the absence of the typical yellow cup-like formations, and from other known forms of tinea capitis tropicalis by the large size of the spores, by its being an "ecto-endothrix" with a surrounding inflammation of the skin—as well as by its other microscopical and cultural characters. The affection was easily cured with "tobacco soap."

P. S. A.

CHALMERS (Albert J.) & MACDONALD (Norman). *Animal Inoculations of Trichophyton discoides Sabouraud 1909.*—*Jl. Trop. Med. & Hyg.* 1915. June 1. Vol. 18. No. 11. pp. 121-122. With 1 plate.

This is the fourth of a series of papers on “*Tinea capitis tropicalis*” in the Anglo-Egyptian Sudan.

The authors believe that *T. discoides* infection has an “equine” and not “bovine” origin. BANG’s and BODIN’s cases were infected from horses and experimental inoculations in Egypt have been successful in the case of a donkey but not with other animals—a bull and a monkey. The paper is illustrated by photographs of cultivations.

P. S. A.

CASTELLANI (Aldo). *Tokelau (Tinea imbricata).*—*Far East. Assoc. Trop. Med. C. R. Trois. Congrès Biennal, Saigon* (1913). 1914. pp. 271-283.

The author gives an excellent and exhaustive account of the disease, giving due credit to the important observations of Sir P. MANSON in 1879-1882, who introduced the very appropriate name of *Tinea imbricata*. The home of this disease seems to have been the Malay peninsula, whence it has spread towards the south, and then east to many islands of the South Pacific, northwards to some parts of China as far as Foochow, and westwards to Burma and Ceylon. The conditions favourable for its development are a warm, damp and equitable climate.

The author has been the first to succeed in cultivating the fungus, which is not an “*Aspergillus*.” He suggests the creation of a new genus—“*Endodermophyton*”—with probably a plurality of species of which he has cultivated two, viz., *End. concentricum* and *End. indicum*. These fungi grow between the superficial and deep strata of the epidermis and do not invade the hair follicles or cause suppuration. Botanically they are allied to the *Achorions*. They do not grow readily on solid media direct from the scales; but they do in glucose-broth tubes, whence subcultures on solid sugar media can readily be obtained. He gives details of their growth on various media.

In Ceylon the disease is rare in children and more common in young men, especially in those living in the country.

The lesions formed by *E. indicum* seem to differ slightly from those due to *E. concentricum*, being perhaps more superficial and with the scales not so close together. The affection is easily reproduced in human beings by inoculating the scales, as was done by MANSON, or from pure cultures of the fungi—the latter taking 12 to 20 days for the development of the eruption.

The author gives the differential diagnosis from ringworm, ichthyosis, pityriasis rubra and *tinea intersecta*. He remarks upon its chronicity and difficulty of cure. The most efficacious treatment he has found to be resorcin, 60 to 120 grains, in one ounce of tincture of benzoin, painted on once or twice daily.

P. S. A.

**MEDINA JIMÉNEZ (R.).** *Nota sobre Algunas Afecciones Micóticas.* [A Note on Certain Mycotic Affections.]—*Gaceta Med. de Caracas.* 1914. June 15. Vol. 21. No. 11. pp. 113–116. With 1 plate.

The object of this paper is to draw the attention of practitioners in Venezuela to three forms of mycelial disease which have not hitherto been recognised in that country. The first occurred in a tumour of the jaw in a young girl and clinically resembled actinomycosis. The characteristic yellow granules and ray-formation were, however, wanting. The author believes that this disease occurs in cattle in Venezuela, going by the name of "galapago." He gives an illustration of the mycelium found.

The other two forms are described in JEANSELME's text book of tropical mycology,\* the first one having been recorded by SABOURAUD as occurring in the Far East. In Venezuela it goes by the name of "empeine caballuno," or horse-ringworm. It seems to be allied to *Tinea circinata*. The second is a form of lichen which attacks the wrists and ankles, and appears to be contracted by standing in stagnant water†. In China it goes by the name of "Khi-Huen." The author's descriptions are necessarily brief, being chiefly intended to elicit further information; but he gives some good coloured illustrations of the mycelium found in the lesions. Dermatologists are advised to look at the original paper.

J. B. Nias.

**ESCOMEL (E.).** *Sur la Blastomycose humaine au Pérou et en Bolivie.*—*Bull. Soc. Path. Exot.* 1915. Mar. Vol. 8. No. 3. pp. 90–92.

Under the name "Espundia" the inhabitants of Southern Peru and Northern Bolivia include a number of tropical ulcers the true nature of which is little known. LAVERAN and NATTAN-LARRIER found *Leishmania*, but in many cases *Blastomyces* in abundance instead of *Leishmania* were found by the author.

The disease in these cases commences as a cutaneous ulcer on the neck, forearms, and especially on the legs. Secondly, after a long interval as a rule, ulcerous growths are developed on the mucous membranes of the mouth, etc., and on the face and ears. The general health may long remain unaffected, but the disease spreads and one of the most persistent and annoying symptoms is profuse and constant salivation.

The parasites are easily cultivated on Sabouraud's and other media, and retain their vitality for months after drying the mucus containing them. Inoculated in guinea-pigs blastomycotic nodules are developed.

Some cases of Espundia in Peru and Bolivia have been cured by "606"; others are unaffected by it. The author suggests that those which yield to salvarsan are due to the *Leishman* organism, while those which do not are caused by blastomycetes. In the latter cases iodides give the best results.

P. S. A.

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\* *Dermatologie Exotique*, Paris, 1904.

† [This would seem to be *Tinea Sabouraudi tropicalis* (v. CASTELLANI and CHALMERS, p. 1482 of the 2nd edition).—*Manual of Tropical Medicine*, 1913. London: Baillière, Tindall & Cox.]

**SCHOEBL (Otto).** **The Etiology of Trichomycosis palmellina in the Philippine Islands.**—*Philippine Jl. Sci.* Sect. B. Trop. Med. 1914. June. Vol. 9. No. 3. pp. 219–224. With 1 plate.

This affection appears to be common among the white people living in the Philippine Islands. It occurs more frequently in blonds than in brunettes and in the warmer months when perspiration is increased. It is not found in the dark races, except in albinos. The author examined microscopically and culturally hairs from a number of cases and found in every case and in every stage of the disease, colonies of "corynebacterium" which he considers to be the cause of the pathological condition. Micrococci and other micro-organisms were found more or less frequently, but not so abundantly nor so constantly.

P. S. A.

**SEMON (H. C.).** **Case of Madura Foot.**—*Brit. Jl. Dermatol.* 1915. June. Vol. 27. No. 6. (No. 320). pp. 240–241.

Dr. A. C. Semon showed at the Dermatological Section, Royal Society of Medicine, a typical case of Madura foot in an Indian soldier, a native of the North-west Provinces of India, where the disease is not so common as in Southern and Eastern India. The man came with his regiment from India last October, and nothing was observed until after an injury to the foot in January this year, when swelling set in. The patient ascribed the affection to the accident in January but, as Dr. Semon observes, there is little doubt that the disease was contracted before he sailed from the East. About two months after the injury he was troubled with itching and a clear discharge developed. There has been little or no pain and no temperature. The Wassermann reaction was negative and there was no other abnormality. The swollen foot showed an extensive area of darkened skin over the dorsal and tibial aspects, with soft protuberant masses of dusky purple granulation exuding clear and purulent fluid, which contained minute black granules. These were proved microscopically and culturally to be the mycetoma fungus. The cultures and sections were shown.

P. S. A.

**FLU (P. C.).** **Ein atypischer Fall von Mycetoma pedis, kompliziert mit einer blastomykotischen Infektion.** [Also in Dutch].—*Mededeel. Burgerlijken Geneesk. Dienst. in Ned.-Indie.* 1914. Vol. 3. No. 1. pp. 41–82. With 1 plate.

An interesting case was admitted in 1912 at the military hospital at Weltevreden of an Arab who had lived in Java for several years. He had hurt his foot against a stone six years previously, with the loss of the left big toe nail, and had dressed the wound with his own urine. A growth subsequently appeared on the toe, and this he cut with a razor. The swelling continued and other growths developed around, forming together a large nodulated mass, about the size of a goose's egg, of darker colour than the surrounding skin. In 1912 the left knee joint became swollen and painful, and there was a temperature of 38.4° C. Potassium iodide was given without effect on the tumour, which was removed by a Pirogoff's amputation.



Microscopical, serological and numerous cultural observations proved the existence of both Blastomycetæ and a streptothrix.

The whole subject is elaborately discussed in this paper, with extensive tables and references. The author believes that this is the first time that the combination of a streptothrix and blastomycetal infection has been recorded.

P. S. A.

PEPERE (Alberto). **Sul Fungo Parassita di un "Micetoma a Grani Neri" del Piede (Carter), Nostrano.** [*Monosporium apiospermum*, Sacc. (*M. sclerotiale*).] **Ricerche micologiche, sperimentali e anatomiche.** [On a Parasitic Fungus from a Case of Mycetoma of the Foot of Indigenous Origin].—*Sperimentale*. 1914. Dec. 11. Vol. 68. No. 5. pp. 531-608. With 6 plates.

An elaborate account of the microscopical and cultural features of a fungus isolated from a case of Madura foot of European origin, the patient never having been out of Sardinia. The disease had lasted for 18 years, and finally the foot was amputated, the conditions of the parts being shown in a coloured plate. The author's conclusions as to the affinities of the organism found are stated in such detail that it is hard for anyone who is not a specialist in mycology to follow them, or to abstract them satisfactorily. Readers interested in this particular subject will therefore do well to consult the original paper.

J. B. N.

SFAMENI (A.). **Dermatite professionall.** [Professional Skin Eruptions.] —*Lavori d. Soc. Ital. di Patologia Esotica*. 1914. pp. 167-174.

A controversial paper, not containing many details, having reference to the author's previous work on the subject of *Dermatite da Canna*, i.e., the dermatitis produced by handling reeds which have been stacked so as to sweat and become mouldy. A useful bibliography of memoirs on the subject is appended.

[The species of reed which causes these symptoms is not mentioned—but THIBIERGE (*Pratique Dermatologique*, 1901, Vol. II, p. 448) states that similar symptoms are produced by *Arundo donax*, when stacked; the mould which develops being *Sporotrichum dermatodes*.]

J. B. N.

KIRBY-SMITH (J. L.). **Extensive Creeping Eruption.**—*New York Med. Jl.* 1915. Mar. 13. Vol. 101. No. 11. Whole No. 1893. pp. 506-507. With 2 figs.

The author records 30 cases of a "creeping eruption" during a four years' residence in Florida, but in no case has he found the burrowing larva. The creeping eruption lesions, when first seen, are raised erythematous lines, possibly one-eighth to one-twelfth of an inch above the skin, with a tortuous irregular course, the near by skin becoming slightly erythematous, the furrow rapidly filling with serum, which in the course of a day becomes seropustular. These are either ruptured by the scratching of the patient, or dry up leaving a crusted lesion. New lesions will at times begin within an inch or so from the

old one. The only treatment that has given uniform results in the author's hands has been by cutting the skin over the furrows with a bistoury, and applying tincture of iodine and phenol in equal parts. The author has seen several cases which had been diagnosed as uncinariar dermatitis or "ground itch," which is very common in the Southern States. He gives photographs of a case.

P. S. A.

**MACRI (Pietro). Dermatite pruriginosa da acaro delle fave secche.** [Pruriginous Dermatitis produced by the Acarus of dried Beans.]—*Malaria e Malat. Paesi Caldi*. 1914. Sept.-Dec. Vol. 5. No. 5-6 pp. 340-343.—*Lavori di Soc. Italiana Patologia Esotica*. 1914. pp. 176-178.

An account of an eruption which attacked all the members of a gang of two men and ten women who were employed in handling a wagon-load of dried beans. The symptoms commenced with an intense itching on those parts of the body which were exposed to the dust arising from the handling of the beans, namely, the neck, arms, chest, and ankles. The itching was followed by the appearance of an erythema accompanied by vesicles and papules which gave rise to scratching. A sensation of burning in the throat with dyspnoea from inhalation of the dust was also observed, along with cough and the expectoration of mucus, and in two cases there was also a slight elevation of temperature. The symptoms subsided in two or three weeks, but the nature of the treatment adopted is not mentioned. The author attributes the symptoms to the acarus of dry beans (*Pediculoides ventricosus*).

J. B. N.

**CORLETT (William Thomas). Xeroderma pigmentosum following Severe Sun Exposure, with Report of Two Cases.**—*Jl. Cutan. Dis. Including Syph.* 1915. Mar. Vol. 33. No. 3. Whole No. 390. pp. 164-169. With 2 plates.

In this interesting paper the author suggests the sun's rays as an etiological factor in this disease, and describes two cases in which the symptoms commenced after exposure to the sun. He also refers to a number of other cases recorded by various authors which followed sunburn. He observes that the degenerative changes in the skin characteristic of the disease are more likely to take place in skins which do not "tan," than in those white skins which do become darkened. He considers it probable that the condition is primarily dependent on an inherited susceptibility or predisposition, which is called into action by certain rays of the solar spectrum.

P. S. A.

**CHALMERS (Albert J.) & DREW (C. M.). Atrophoderma biotriptica in Natives in the Anglo-Egyptian Sudan.**—*Jl. Trop. Med. & Hyg.* 1915. May 1. Vol. 18. No. 9. pp. 99-102.

The authors discuss briefly our present knowledge of atrophic changes in the skin, and describe cases occurring in the Sudan in old subjects in which the condition is akin to the "biotripsis" described by

CHEATLE in 1909. Hitherto, the only other cases noted in the tropics have been by CASTELLANI and CHALMERS in Ceylon. The fact is emphasised that the atrophoderma is pathological and not a physiological change due merely to old age. It does not occur in every old person; it occurs only in limited areas; and it may occur in younger subjects in exposed areas of the skin. Sections show more or less atrophy of the various layers and elements of the skin, but the elastic tissue does not appear to be affected; there is increase of pigmentation, but no evidence of hyperaemia or inflammation.

The chief clinical diagnostic points are:—The shrinking and glazing of the skin in exposed parts in old people, with hyper-pigmentation and scaling.

The paper concludes with a bibliography and plates illustrating the condition on the leg of a native, with photographs of microscopical sections.

P. S. A.

CONCEPCIÓN (Isabelo). **Observations on Mango Rash.**—*Philippine Jl. Sci. Sect. B Trop. Med.* 1914. Nov. Vol. 9. No. 6. pp. 509–513.

Four newly delivered mothers in the Philippine General Hospital were fed with about six mangos daily. A papulovesicular itching eruption was usually produced, which could be made to disappear and reappear by discontinuing and renewing the mango feeding. The rash commonly developed in the mammary regions, the neck and extensor surfaces of the arms—also frequently on the face in the babies.

P. S. A.

GIBSON (R. B.) & CONCEPCIÓN (Isabelo). **The Lymphagogenic Action of the Philippine Mango, *Mangifera Indica* Linnaeus.**—*Philippine Jl. Sci. Sect. B. Trop. Med.* 1914. Nov. Vol. 9. No. 6. pp. 503–508.

The transient rashes occurring in the Philippines during the hot season are often ascribed to eating the Philippine mango (*Mangifera indica*). It seems also to intensify the ordinary "Prickly heat." The nursing child may also be affected when mangos are eaten by the mother. Experiments were carried out to determine whether the mango is to be classed with such rash-producing substances as shell fish, etc., which HEIDENHAIN called "lymphagogues" of the first class. Intravenous injections of mango juice were made in dogs anaesthetised with ether, and lymph collected from the thoracic duct. An increased flow of lymph, richer in solids, resulted, as well as a fall of blood pressure and sometimes inhibition of blood clotting.

P. S. A.

HALLENBERGER. **Multiple Angiosarkome der Haut bei einem Kameruner.** [Multiple Angiosarcoma of the Skin in a Native of the Cameroons].—*Arch. f. Schiffs- u. Trop.-Hyg.* 1914. Oct. Vol. 18. No. 19. pp. 647–651. With 3 plates.

The patient, aged 26, of the Mabea race, had had the disease four years. It commenced as small growths of the size of a pea or bean

on the left hand and foot, and these had been removed at the hospital. Three years afterwards similar tumours appeared on the extremities of the right side causing pain in walking and in his work. Microscopical examination revealed angio-sarcoma. The internal organs were healthy, but microfilaria were found in the blood, and the author suggests that these may have had some causal relationship.

P. S. A.

**BREINL (Anton).** **Gangosa in New Guinea and its Etiology.**—*Ann. Trop. Med. & Parasit.* 1915. June 30. Vol. 9. No. 2. pp. 213-232. With 4 plates.

During a short journey in New Guinea the author saw a number of cases of "Gangosa" or "Rhynchopharyngitis mutilans," especially on the south coast and in the western part of British New Guinea, where the disease seems to differ in its earlier stages from the affection as described by CASTELLANI and CHALMERS. In New Guinea it commences as a small ulcer on the upper lip, just below the nose, the ulceration spreading and destroying at first the lips, alae and cheeks and secondarily the deep tissues, cartilages and bones. After a time, dense scar tissue is formed, leading to the deformities of the face so characteristic of the disease.

Histories of 17 typical cases are given, and these show that gangosa is a definite morbid entity and can be differentiated from other diseases causing similar lesions, such as syphilis, lupus and leprosy. It is a chronic but very rarely fatal complaint, most of the patients recovering without specific treatment, but with extensive destruction of the face. The majority of the cases seen were in females. Oedema fluid from five early and two later cases treated with Giemsa's stain showed yeast-like cells of the genus "Cryptococcus." The author regards this as the cause of the disease and proposes for it the name "*Cryptococcus mutilans*."

A table of references is appended together with photographs of twelve cases in various stages of the disease, and drawings of the fungus.

P. S. A.

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## BERIBERI.

CHAMBERLAIN (Weston P.). **Prevention of Beriberi among Philippine Scouts by Means of Modifications in the Diet.**—*Jl. Amer. Med. Assoc.* 1915. Apr. 10. Vol. 64. No. 15. pp. 1215-1220.

The Philippine scouts are a body of about 5,000 native troops officered by Europeans. They mix freely with the native population who suffer extensively from beriberi. The scouts were formerly also affected, a maximum of 618 and 550 cases being reached in 1908, and 1909. In 1910 changes in the dietary were introduced and from that time the incidence rapidly fell, so that in 1913 there were no cases. The change in diet consisted chiefly in reducing the amount of rice supplied, undermilled rice being substituted for polished rice with a *compulsory consumption* of 1·6 oz. of beans daily. No improvements in the sanitary conditions were made at the time. The eradication of the disease among the scouts at a time when they mixed freely with the general population who still had much beriberi is very strong evidence against the theory held at first in the Philippines that beriberi is an infectious disease.

The author also draws attention to the fact that the Europeans, who mixed freely with the natives and were often on short rations in arduous campaigns, suffered little from the disease. This is explained by the long, so called, incubative period; for natives subsisting mostly on polished rice this has been found to be from sixty to one hundred and sixty days or even longer. In the white forces the deficiency conditions are rarely likely to last so long.

TABLE IV.

Filipino Ration, Army Regulations 1913, paragraph 1,205 in force from June 1911, till present date.\*

Component Articles.	Quantities, Ounces.	Substitutive Articles.	Quantities, Ounces.
Beef, fresh .. .. .	12	Bacon.	8
		Canned meat.	8
		Fish, canned.	12
		Fish, fresh.	12
		Hard bread.	8
		Soft bread.	8
Flour .. .. .	8		
Baking powder, when in field and ovens are not available	0·32		
Rice, unpolished .. .. .	20		
Potatoes .. .. .	8	Onions.	8
Coffee, roasted and ground ..	1		
Sugar .. .. .	2		
Vinegar .. .. .	0·08		
Salt .. .. .	0·64		
Pepper, black.. .. .	0·02		

\* "Scout organizations will be required to use the entire allowance of the meat component, and not more than 16 ounces of rice per day to be used for each ration. The purchase of 1·6 ounces of beans per ration in substitution of the portion of the rice ration not drawn will be made, and use of as large an extent as possible of native products, such as camotes, mongos, and squash, will be required."

In considering the deficiency theory of beriberi the author lays great stress upon two main points:—(1) Many articles of diet other than rice are relatively deficient in the neuritis-preventing vitamins; (2) Exposing food to a temperature above a certain point decomposes the neuritis-preventing vitamins present. He again urges the necessity of state legislation to reduce the prevalence of this preventable disease, "which is a much more serious menace to the oriental races than is typhoid fever to the people of the occident." Many interesting tables are given in the paper, two of which are reproduced.

TABLE VI.

Rates per thousand of admissions for beriberi and for all other diseases among Philippine Scouts.

Calendar Year.	Beriberi.	Other Diseases.
1902	121.42	1,489.14
1903	125.60	1,144.85
1904	74.62	948.59
1905	35.93	1,101.43
1906	36.98	1,138.27
1907	24.58	956.83
1908	121.53	786.24
1909	103.93	727.14
1910	9.22	738.67
1911	0.57	665.97
1912	0.37	616.79
1913	0.00	585.36

P. W. Bassett-Smith.

HEISER (Victor C.). **Beriberi. An Additional Experience at Culion. How can a Knowledge as to its Prevention best be applied from the Standpoint of State Medicine?**—*Far East. Assoc. Trop. Med. C. R. Trois. Congrès Biennal, Saigon* (1913). 1914. pp. 369-373.

An outbreak of beriberi in the Culion Leper Colony (Philippines) is referred to, which was definitely dependant upon the enforced supply of polished rice. The incidence and mortality rates showed that two months after the polished rice was issued beriberi began to appear and that the maximum number of cases was reached three months after its use was begun, and that three months after the unpolished rice was again issued beriberi cases had completely disappeared. With three thousand inmates in the institution the annual death-rate from beriberi prior to the use of unpolished rice was 201 per 1,000; this fell to nil in 21 months when unpolished rice was used, and when polished rice was resumed it again rose to 157 per 1,000, to disappear a second time when the unpolished rice was supplied. The educational methods of combating the disease have practically failed and the author is strongly in favour of heavily taxing polished rice so that its manufacture would no longer be remunerative, and the polished rice would only be bought by the better classes, who are able to supplement its use with many other kinds of food which prevent beriberi.

P. W. B.S.

SCHAUMANN (H.). **Die Aetiologie der Beriberi.** II.—*Beihefte z. Arch. f. Schiffs- u. Trop.-Hyg.* 1914. July. Vol. 18. Beiheft 6. pp. 7-246. [365-604.]

In this elaborate work the author recapitulates the investigations and experiments which have any bearing on the etiology of beriberi. The first part deals with experimental polyneuritis of animals, and the effect of rice, rice extracts, and other preparations on the condition. From these he concludes (1) that malt is the most active anti-neuritic agent, rice bran coming next; (2) the whole of the anti-neuritic substances cannot be extracted with alcohol; (3) the anti-neuritic substances are probably not free in the various foods, but are fairly fast chemical combinations with other substances; (4) the administration of antineuritic extracts greatly increases the appetite of the animals, which is not an unimportant factor. He then discusses "insufficiency" diets, namely those containing sufficient proteids, hydrocarbons, fats and salts but which will not support the life of the animal for long periods. Then follows a discussion on vitamins, anti-neuritic principles, activators, and hormones, all different names for the unknown substances which produce such striking effects on beriberi. He is in almost entire disagreement with FUNK as to the composition and character of vitamins, and believes that they are split off in the process of extraction from some mother substance present in the food, and that this mother substance is combined with phosphorus in some organic compound. He next goes into the consideration of metabolism in beriberi especially the phosphorus changes, and quotes a statement of VEDDER (p. 215) which he takes as supporting his argument that phosphorus-containing substances are the real antineuritic principles. These may be either organic phosphorus compounds (the mother substances of vitamins) or bodies which influence phosphorus metabolism (which he calls "phosphatesen," of the nature of a ferment). The question whether experimental polyneuritis in animals and beriberi are the same diseases requires further investigation.

In his conclusions he states that the pathogenesis of beriberi is not yet clearly established but it seems certain that there is at least one form which is due to diet; whether the others are of an infectious nature is very doubtful, as is the existence of some intestinal flora which destroys the vital substance in the food. In the purification of the phosphorus compounds the lightly attached vitamins in some of them (Phosphatides) appear to get split off; in others (nuclein and nucleic acid) the vitamins are more firmly attached and stronger chemical measures are required to isolate the mother substances, and in the process the vitamins are separated and destroyed; in this way the phosphorus compounds, which in their natural condition have anti-neuritic properties, lose them in the extracts partially or entirely. The antineuritic substances increase both the appetite and the metabolism of the body, causing a more complete using up of the carbohydrates and proteids of the food but they do not affect the phosphorus metabolism. As the quantity of vitamin is so small, it cannot be considered as supplying energy or foundations for cell or tissue formation, but rather to act as an intermediary in certain chemical changes or as a catalizator, and as the animal cannot make these for itself they must be supplied in the food stuffs.

The author believes that the pathogenesis of beriberi can only be explained on the basis of a number of lesions produced by a number of dietary defects; the most important are those produced by direct disturbances of metabolism through insufficient phosphorus compounds in the food, or by indirect disturbances through an insufficient supply of bodies indirectly influencing metabolism (vitamines and *Phosphates*). In the milder forms of beriberi and ship beriberi, which more closely resemble the disease in pigeons, the principle factor may be a lack of the indirectly working bodies (vitamines). In the more severe atrophic form both factors probably come into play, especially the want of organic phosphorus compounds. The investigation covers a wide field bearing on the physiology and pathology of nutrition, with the etiology of a series of other diseases endemic in Europe. The monograph, with its excellent list of references, is a powerful attempt to uphold the author's own theories which have previously been published, and is a record of a painstaking collection of minute detail which appears at times very involved and in places almost contradictory.

P. W. B.S.

**BRÉAUDAT & LALUNG-BONNAIRE. Beriberi Mécanismes de l'Action nocive du Riz décortiqué et de la Protection due à Diverses Substances. Mode de Traitement qui en Résulte.—*Far East. Assoc. Trop. Med. C. R. Trois. Congrès Biennal, Saigon (1913). 1914. pp. 331-346.***

In opening the discussion on beriberi at the Congress the authors enumerated the various etiological theories held and showed that in their conception none of them was correct. They then went on to describe some analyses of the food supplied to different groups of people, with and without beriberi, and the analyses of the excreta. They applied the knowledge thus obtained to methods of treatment. The following conclusions are given :—

(1) The symptoms of beriberi are those of acidosis and partial inanition, the first resulting from an excess of organic and mineral acids in the intestines, through microbic fermentation of the hydrocarbons, and insufficiency of biliary and pancreatic secretions.

(2) The partial inanition affects the nuclear substances. It is the consequence of intestinal fermentation which wastes abnormally the nucleo-proteids and phospho-proteids of the food.

(3) All substances or foods capable of maintaining normally the intestinal secretions and which insure as complete as possible a utilisation of the proteids, hydrocarbons and fats, are able to protect rice eaters.

(4) For beriberi the injection of 30 cc. of secretine or 2.5 gm. of pro-secretine in 24 hours has given good results without any change of food.

Extracts of fresh rice bran injected in the muscles (50 mgm. in 24 hours) produce identical effects.

P. W. B.S.



**BRÉAUDAT.** *Sur l'Ecllosion du Béribéri Épidémique.*—*Far East. Assoc. Trop. Med. C. R. Trois. Congrès Biennal, Saigon* (1913). 1914. pp. 346–352.

In continuation of the previous report the author shows that many other factors may favour the production of beriberi, such as external conditions which lower the resisting power of the individual, or the infection of the food by ferments, either outside the body or in the stomach. Rice always contains many spores of bacteria but much depends upon the age, storage, and cooking. The spores after ingestion give rise to bacteria which are more or less active in setting up acid fermentation. He gives an example of microbic infection of the rice outside the body. Two prisons only separated by a wall were supplied with rice taken from the same source and similarly cooked etc. In one, beriberi was ten times more prevalent than the other, and this is said to have been due to the insanitary conditions and the enormous number of flies which infected the food before it was consumed. When samples of the two foods were examined in the laboratory, that from the infected prison showed after 24 hours a marked increase in acidity due to fermentations, this producing an acidosis when ingested. Other examples were given. The importance of protecting food from outside infection by flies is thus believed to be well demonstrated.

P. W. B-S.

**MAXWELL (J. Preston).** *Beriberi in the Province of Fukien.*—[Paper read before a Recent Conference of the China Medical Missionary Association]. 3 pp.

Cases may be divided into (1) imported cases, (2) typical cases arising in Fukien itself, and (3) obscure cases probably of incipient beriberi. The first group are fairly numerous, and mostly come from the Straits Settlements. In the second group, sporadic cases occur all over the province but are most common in the coast ports, especially in Amoy; these can be generally traced to the consumption of polished rice which is very little used in the country districts. No epidemics have been noted. In the third group, cases of peripheral neuritis are described; these appear to follow dysentery and debilitating diseases which recover on anti-beriberi treatment.

P. W. B-S.

**KAWASHIMA (K.).** *Zur Beriberifrage. (Die Ernährungsversuche zur Beriberi-Verhütung aus den Mitteilungen der Japanischen Beriberi-Studien-Kommission.)* [Feeding Experiments with a View to the Prevention of Beriberi].—*Far East. Assoc. Trop. Med. C. R. Trois. Congrès Biennal, Saigon* (1913). 1914. pp. 373–382.

The author from his own experience and that of others in Japan gave evidence and tables to show that the use of "parboiled" rice was not sufficient to prevent the occurrence of beriberi, but as pointed out by KUENEN the composition of such rice is very variable,

Samples examined in 1909 gave a percentage of 0.6 of  $P_2O_5$ , in 1911 from 0.4 to 0.28, and it was possible that the samples used

by the author were deficient in the essential parts. The efficiency of rice as a food may be destroyed before it is cooked and also very largely by the methods of preparation.

In spite of these facts the author maintains the view that beriberi is an intoxication from some agent not yet isolated.

P. W. B-S.

**McCOWEN (G. R.). An outbreak of Beriberi in R.I.M.S. "Northbrook."**  
—*Jl. R. Naval Med. Service.* 1915. Apr. Vol. 1. No. 2.  
pp. 195-197.

This ship, belonging to the Royal Indian Marine, was commissioned in August 1914 for special service in the Royal Navy during the war. Her original crew, consisting mostly of lascars, was supplemented by thirty-four Europeans from H.M.S. "Alert" and the armed launches of the Persian Gulf. In December there was a small outbreak of beriberi affecting only the Europeans. Three cases occurred in quick succession and on medical inspection of the ship's company seven others showed signs of oedema of the legs. One case was acute, with rapid loss of knee jerks, hyperaesthesia, anaesthesia, and dilated heart. No definite cause could be given for the outbreak beyond lack of fresh vegetables and mouldiness of the flour, but it is noted that all ten men came from the same mess, who were supplied with the same food as the rest of the ship's company. As soon as possible fresh vegetables were issued every day and lime juice given. No further cases occurred.

[As the white crew, who were alone affected, were drawn from H.M.S. "Alert" and the armed launches of the Persian Gulf, the disease, which has a very long incubation period, may have been contracted before the "Northbrook" was joined, but its onset was hastened by the dietetic conditions in that ship. The fact that all the cases came from one mess points to over cooking in this particular mess and destruction of the active vitamins present only in small quantities. This outbreak is also a good example of the close relationship which exists between ship beriberi and scurvy.]

P. W. B-S.

**DICKENSON (George O. M.). A Personal Experience of Beri-beri.**—*Jl. R. Naval Med. Service.* 1915. July. Vol. 1. No. 3. pp. 323-325.

A man-of-war employed on the arduous and monotonous duties of blockading in the Persian Gulf provides many of the factors which predispose to beriberi. It is interesting therefore to read the personal experiences of Staff Surgeon Dickenson who contracted the disease there. For a year the ship's company lived in a hot, damp climate with a temperature varying from 85° to 67°, the awnings at night dripped with moisture, so that bedding used on deck was always damp in the mornings, accommodation below was poorly ventilated, opportunities for landing were rare, and exercise was difficult to get. The food, though abundant, was mostly tinned, with weekly supplies of fresh meat, fish, vegetables, and fruit, poor in quality and unappetising; rice was rarely used. In the discussion of the etiology eight points are noted, from among which one stands out prominently

as a possible cause why the author alone was affected. For two months preceding the climax of the attack he ate no fresh meat, but took only tinned food or ham, the onset occurring two weeks after going on this diminished diet, but over nine months after joining the ship under these depressing conditions. It is important to note that six cases of beriberi took passage in the ship for 48 hours, the author and a sick berth attendant alone came in direct contact with them, the latter by far the most frequently, yet he did not contract the disease. The clinical symptoms are described; they were of a moderately severe mixed type, and fortunately he made a perfect recovery.

P. W. B-S.

**MACKINNON (J. M.). East Africa Protectorate. Report on the Outbreak of Dysentery and Jubaland Neuritis in the Marehan Patrol, 1914.**—Received in Colonial Office Jan. 15, 1915.

This is a report on an outbreak of dysentery and neuritis in Jubaland among the troops of the Marehan patrol. The former disease was traced to an unsatisfactory food supply, and the unsanitary conditions at Garebahare affected at least 17 per cent. of the troops who had removed to Serenli. On the provision of better food and improvement of the sanitary conditions it rapidly decreased. Cases of neuritis were frequent; these appeared like early cases of beriberi and were sometimes diagnosed as such, but were generally of short duration. It was noticed that the Yaos were mostly infected and for these the food supplied at Serenli was unsuitable; in their own country (Nyasaland) they were accustomed to plenty of fresh fruit and vegetables, which at Serenli were very deficient. The weekly ration in Jubaland was rice 3½ lb., flour 3½ lb., meat (including bones) 4 lb., dates 21 lb., ghee 14 ozs., but it often was much lower, and the rice and flour were frequently stale and bad. The dysentery and neuritis prevailed at the same time and affected most those who had been longest in the country and were employed at the hardest work. When the food was improved both diseases decreased in frequency. Dysentery affected all races but no cases of neuritis occurred among the Somalis.

Treatment for the neuritis was most unsatisfactory; change in locality appeared necessary to bring about a cure. Several important suggestions are offered: greater variety in diet, more frequent renewals of rice and flour, and the establishment at Serenli of a vegetable garden to supply fresh beans, peas, etc., for the troops.

[We have here again a condition simulating beriberi, undoubtedly traced to a deficiency in vitamine-containing food.]

P. W. B-S.

**ARABANTINOS (Anastasios I.). ΑΡΑΒΑΝΤΙΝΟΥ (ΑΝΑΣΤΑΣΙΟΥ Ι.) Μπεριμπέρι; υπάρχει ή νόσος εις την Έλλάδα.** [Beriberi; does the Disease exist in Greece?].—, 'Ιατρική Προόδος.' 1915. Feb. 1-15. Vol. 17. Nos. 3-4. pp. 33-37; Nos. 5-6. Mar. 1-15. pp. 79-84; Nos. 7-8. Apr. 1-15. pp. 115-119.

A discussion of the question whether beriberi is to be found in Greece. As rice, although cultivated and eaten in Greece, does not anywhere form the staple food of the people, it is not to be wondered at that beri-beri

is not endemic in the country. The diet of the poorer classes in Greece, as elsewhere in Europe, is deficient in albuminoids and fats and contains an excess of carbohydrates, consisting as it does chiefly of bread. The bread of the poorer classes, however, is the so-called black bread, containing a large proportion of bran, and therefore does not seem to be deficient in vitamins. White bread is only eaten by the more well-to-do classes and is only an accessory in their diet. It is, however, not beyond the bounds of possibility that sporadic cases of the types referable to the beriberi of asylums may occur in Greece as elsewhere in Europe. The greater part of this paper is taken up with a systematic account of the disease and its etiology, such as will be found in most of our text-books. It is probable that the disease is still somewhat of a novelty to the Greek practitioner.

J. B. Nias.

GRIJNS. **Some Remarks on Beriberi and on Polyneuritis in Fowls.**—*Far East. Assoc. Trop. Med. C. R. Trois. Congrès Biennal. Saigon* (1913). 1914. pp. 365–369.

The author draws attention to some facts in support of the alimentary theory of the origin of beriberi and he argues particularly against the misunderstanding that because a patient did not eat rice therefore he could not have beriberi. He states that, granted there exist substances necessary for the maintenance of the nervous system, it is easy to understand that "*Beriberi is not caused by what a man eats but by what he fails to eat,*" and that in every poor diet sometimes the indispensable nerve-food-stuffs may be lacking and so cause beriberi. Also the food supply may be so well balanced that ordinary health is maintained, but when under certain conditions a greater output of nervous energy is required the balance may break down and beriberi develop. The microbic theory of the disease has no scientific proof so far.

P. W. B-S.

NAGAYO (M.). **Referat über Beriberi oder Kakke. Pathologisch anatomischer Teil.**—*Verhandlung d. Japanischen pathologischen Gesellschaft.* 1913. 26 pp. With 7 plates.

This monograph was published two years ago, but as it is frequently quoted and contains very much detail, some reference must be made to it here. Those particularly interested in the subject should however read it in the original; the plates, both plain and coloured, are excellent. The observations are based on the examination of 247 cases of complicated and uncomplicated beriberi, as well as the study of numerous older records. The changes found in the heart, blood vessels, organs, and systems are described in detail, the most striking being depicted in the plates. The author divides these changes into three stages:—(1) retrograde changes, (2) circulatory disturbances, and (3) progressive (restorative) changes.

The first are recognised in the muscular and nervous systems; the primary change is a diffuse parenchymatous cloudy swelling in the voluntary muscles and also those of the heart, arteries, and alimentary tract; when the heart is affected there is produced the venous congestion so marked in cardiac beriberi.

(2). The fatty degeneration and necrosis of kidneys and liver, the glycogen in the latter and the atrophy and degeneration of the abdominal organs are merely results of the venous congestion in the inferior vena cava. It is not necessary to assume the existence of any poison to produce these results. The congestion of the lungs leads to splenization; the oedema of the various organs, tissues and cavities is also due to venous congestion and is not of nervous origin. The anaemia of the skin seen in severe beriberi is not due to a contraction of the superficial arteries but is simply a secondary anaemia following the central venous congestion.

(3). The progressive (restorative) changes are seen first in the hypertrophy of the medulla of the adrenals; the enlargement of the lymphatic apparatus and thymus also belongs to this category. In the peripheral nerves and skeletal muscles regenerations of various kinds are frequently observed. The changes in the lymphatics and thymus may be due to a poison; this point requires further investigation.

It cannot be doubted that the various forms of beriberi represent diseased conditions not appreciably distinct from one another, the incidence of the various forms being dependant on the severity and extension of the nerve and muscular changes, since these are the essential lesions in beriberi. In mild cases the nerves and muscles of the less vital parts of the body are affected and therefore the cases may recover, become chronic, or relapse; while in severe cases, owing to the affection of the heart and probably the cardiac nerves, many serious symptoms and corresponding anatomical changes are produced. In all cases the principal changes occur in the peripheral nerves and muscles and belong to the degenerative processes. The various cell infiltrations seen in the nerves and muscles only appear after the disease has lasted some time and must be regarded as reactionary and reparative. In this sense it is justifiable to describe beriberi as a "multiple neuro-muscular degeneration," and from clinical observations and the pathological findings it is probable that the nerves are affected first, that is, the disease is due to primary nerve lesions.

P. W. B-S.

**KUSAMA (Shigeru). Ueber die Veränderungen des Herzens und Gefaess-Systems bei Kakke (Beriberi).**—[Changes in the Heart and Vascular System in Beriberi].—*Far East. Assoc. Trop. Med. C. R. Trois. Congrès Biennal, Saigon* (1913). 1914. pp. 383-387.

In the pathology of beriberi characteristic changes are found in the heart and circulatory system; these have been specially studied by the author and other Japanese workers. The size of the heart may be greatly increased; from 93 cases YAMAGIWA obtained one which weighed 368 gms. As is well known hypertrophy, or hypertrophy and dilatation, of the right side is the most marked feature, the myocardium showing fragmentation of the muscle fibres, and hyaline and fatty degeneration, the bundles of HISS (NAGAYO) being implicated and the intra-mural nerves degenerated. It is from these pathological causes that dilatation so often results. The lungs frequently become chronically indurated and emphysematous, containing much dark blood. The appearance of anaemia is greatly due to the dilatation

of the pulmonary vessels and contraction of the systemic arterioles. Viscosity of the blood is said to exist by some workers but this might be a post-mortem change. Undoubtedly there are marked alterations in the walls of the blood vessels; sclerotic changes in the intima of the aorta and large arteries have been frequently found by NAGAYO, SCHEUBE, etc., and acute degenerations of the femoral artery are described by the author. The symptoms and complications of beriberi are to a great extent explained by these pathological changes in the vessel walls.

P. W. B-S.

LACAVA (Francesco). **Sopra un caso di Beriberi osservato nell' Italia meridionale.**—*Malaria e Malat. d. Paesi Caldi*. 1915. Mar.-Apr. Vol. 6. No. 2. pp. 49-57.

A case of peripheral neuritis occurring in a country woman aged 17, of Ferruzzano Reggio, Calabria, is described in detail. By a process of exclusion no other diagnosis but beriberi was possible. It is noted that the patient preferred polished rice and ate freely of it, which is unusual among the country people.

P. W. B-S.

HIGHT (H. Campbell). **The Sequelae of Beriberi.** *Far East. Assoc. Trop. Med. C. R. Trois. Congrès Biennal, Saigon* (1913). 1914. pp. 355-358.

In police work in India the author was able to follow up for some years the history and clinical conditions of a number of cases of beriberi which had returned to duty; out of 28 cases he found variation in rhythm of the radial pulse in eleven. Examination of the patella reflexes gave the following results:—

Exaggerated in both legs	..	..	..	..	3
Marked in both legs	..	..	..	..	3
Normal in both legs	..	..	..	..	2
Just present in both legs	..	..	..	..	5
Absent on one side delayed on other	..	..	..	..	2
Absent in both	..	..	..	..	13

There were relapses in five cases in the year following recovery. According to TRAVERS "absolute recovery is the rule," but there is in many cases of apparent recovery continual menace to life.

Death being due to cardiac failure, at post-mortem hypertrophy of the heart and pericardial dropsy are generally found. The cases have an important medico-legal bearing.

P. W. B-S.

CRISÓSTOMO (Edilberto). **Terapeutica del Beriberi por los Compuestos Colestericos (Cerebrina, Paratoxina, Colesterina y Fitosterina).** [The Cure of Beriberi by Cholesterin Compounds].—*Actas. Mem. y Comun. de la 11 Asamblea regional de Med. y Farmaceut. de Filipinas*. 1914. pp. 181-208.

It is a pity that this interesting paper has appeared in such a generally naccessible form. In it the author propounds the theory that the

symptoms of beriberi are not in any way dependent upon the lack of so-called vitamins or phosphorus-compounds in the food, but are due to the low content of cholesterin or similar bodies in the patient's blood. Starting with the observation that hypodermic injections of 3 cc. of cerebrin proved singularly efficacious in promoting sleep in the case of two female lunatics who suffered from insomnia, the author was led to try the effect of the same substance on beriberi patients suffering from neuritis and paraplegia, and according to the cases recorded this was attended with marvellous success. The clinical histories are given of four cases of parturient women and their infants, who were treated in this way with 3 cc. doses of cerebrin injected into the lower limbs of the mother. The benefit extended to such of the suckling infants as were suffering from athrepsia, their mothers being directed to continue nursing instead of weaning them.

From six to ten injections of cerebrin, given on alternate days, generally sufficed to abolish all symptoms with the exception of the loss of patellar reflex. No modification whatever was made in the diet in the way of ordering beans and uncorticated rice, though it is not precisely stated what the patients' diet had been before the supervention of symptoms. Presumably, as they were all natives of the Philippines, ordinary rice entered very largely into their diet. Two further cases of parturient women were then treated in the same way with paratoxin instead of cerebrin with equal success.

Encouraged by such striking results, the author then proceeded to test the effects of cholesterin in the same way. The drug was dissolved in the proportions of 5 per cent. in olive oil, the oil being made up into capsules containing 1 cc. each for the purpose of hypodermic injection. The cases of nine patients, of both sexes, suffering from beriberi, who were treated in this way, are narrated. The cholesterin seems to have acted even better than the cerebrin in previous cases. The author was led to test this substance on the supposition that cholesterin, being a lipid, although not containing phosphorus, is the active agent in cerebrin. A test was then made of phytosterin in the same way upon six more cases, with uniform success, phytosterin being taken as the vegetable equivalent of cholesterin. Finally experiments were made upon five fowls, of which two were retained as controls and fed on ground maize, while the other three were fed on decorticated rice. Symptoms of polyneuritis appeared in all the latter, and were promptly subdued by injections of cholesterin given first daily and then at intervals of two, three or four days, as improvement ensued.

The author terminates his communication with some general observations on the subject of beriberi and its causation, in the sense indicated above.

J. B. N.

**DRUMMOND (J. C.) & FUNK (C.). The chemical Investigation of the Phosphotungstate Precipitate from Rice Polishings.—*Biochem. Jl.* 1914. Vol. 8. pp. 598–615.**

This is a very technical paper describing the authors' attempt to isolate the curative substance for beriberi which is known to be present in rice polishings in a pure condition, and also to examine for other

simple nitrogenous substances contained in the phosphotungstic acid precipitate which might be degradation products of the unstable curative substance. 620 kilograms of rice polishings were examined and four fractions were obtained—(1) sublimate fraction, (2) purine fraction, (3) silver nitrate baryta fraction (which contained the active substance) and (4) residual phosphotungstic acid fraction. Considerable amounts of choline and nicotinic acid, with small quantities of betain, adenine, guanine and possibly guanidine were demonstrated. Attempts to confirm the work of SUZUKE, SHEMAMURA and ODAKE, who claimed to have isolated the curative substance in the form of a picrate, were not successful, and the authors were themselves unable to isolate the curative substance which occurs in rice polishings, this being apparently decomposed during the fractionation.

[An explanation of the loss of the curative substance in the process is given by FRASER and STANTON, see below.]

P. W. B-S.

FRASER (HENRY) & STANTON (A. T.). **The Chemistry of Rice Polishings.**—*Lancet*. 1915. May 15. pp. 1021-1022.

Since 1911 the authors have consistently stated that the active substances in rice polishings, which prevent beriberi, are soluble in alcohol and decomposed by sodium hydrate. Others have attempted to obtain the active agents using baryta in the process, with only partial success. The reasons of these failures are explained by four series of experiments which were carried out on fowls. Six fowls were fed on polished rice with, once daily, the alcohol equivalent of 5 grams of rice polishings; these birds all gained weight. Six were fed on polished rice with once daily the precipitate of the alcoholic extract of 5 grams of rice polishings which had been thrown down by 0.3 per cent. sodium hydrate; these lost weight rapidly. Six were fed similarly but the filtrate was neutralised and evaporated at a low temperature, the equivalent of the non-precipitable material of 5 grams being given daily. These fowls also lost weight. A fourth series received the filtrated substances which had been more completely thrown down by 0.5 per cent. sodium hydrate; most of these rapidly developed polyneuritis.

These experiments proved that sodium hydrate in weak solutions destroys the active substances contained in the alcoholic extract of the rice polishings. FUNK in 1912 believed that he had isolated the active agents (Vitamine) from the rice polishings by fractional distillation, using baryta water. In a later paper with DRUMMOND it is stated that he has so far failed to isolate the curative substance. This the authors attribute to their using barium hydrate in the process, which decomposes the active substance. "Vitamine" as a distinct entity has therefore yet to be discovered.

P. W. B-S.

RAMOINO (Paolo). **Contributo allo studio delle alimentazioni incomplete.**

**Nota II.—Ricerche sul ricambio gazzoso nelle alimentazioni con riso.**—*Pathologica*. 1915. Mar. 1. Vol. 7. No. 152. pp. 101-110. With 7 text figs.

Four pigeons were experimented upon, to show the evidences of metabolism through the respiratory exchanges, while fed on ordinary



grain, polished rice, and polished rice with bran extracts. A very ingenious apparatus was devised, and is figured, to register the oxygen used and the  $\text{CO}_2$  expired. These together with the weight and other details are accurately set out in a tabular form for each experiment, which lasted for several weeks. On the ordinary grain food the birds kept an average weight. The oxygen consumed and the  $\text{CO}_2$  given out remained fairly even; the latter are shown here as  $\frac{\text{CO}_2}{\text{O}_2}$  (about 1.0). After the bird was put on polished rice this figure steadily fell but was particularly marked about the time of the onset of the neuritic symptoms, falling to about half the normal just before death  $\frac{\text{CO}_2}{\text{O}_2} = .51$ .

In experiment 3, after the bird had developed marked neuritic symptoms and the  $\text{CO}_2$ :  $\text{O}_2$  coefficient had fallen to .53, treatment with bran extract caused a rapid and marked improvement, the coefficient rising at once to .80 but falling again when the remedy was omitted and the bird died. There are several characteristic figures of the birds in spastic paralytic attitudes.

P. W. B-S.

SAKAI (S.) & HIRAMATSU (T.). Ueber die vasokonstriktorische Wirkung des Serums von Kakke-Kranken auf die überlebenden Froschgefäße. [The Vasoconstrictor Action of the Serum of Beriberi Patients on the Frog's Arteries].—*Mitteil. a. d. med. Fakultät d. Kais. Univ. z. Tokyo*. 1914. Vol. 13. No. 1. pp. 177-196.

The authors made a number of experiments on toads (frogs not being obtainable in Tokyo), to determine whether the serum of beriberi cases had a constricting action on the small arteries, and incidentally several other debated points relating to the subject. O'CONNOR recently has shown that though serum has this action, plasma has not, except when obtained from the perirenal veins, which contain some adrenalin, and (2) that the active substances are produced during the coagulation of the blood. SHIMAZONO showed that the serum and even oedematous fluid of beriberi cases act upon the eyes of frogs. The author examined the activity of the serum and plasma of 93 cases of beriberi, also a case of nephritis, Addison's disease, Graves' disease, and diabetes insipidus. The technique is minutely described and the results are set out in a number of tables which are full of detail. The conclusions may be shortly stated thus. The serum of all cases of beriberi has some vaso-constrictive action on semi-devitalised frog tissue (the vessels are washed through with Ringer's solution for two hours before the test fluid is used, to avoid irregular contractions), its action is strongest in the progressive stages of the disease, and it has some relationship to the number of blood platelets present; the plasma being inert in comparison with the serum. The serum of Graves' disease is also active, that of nephritis, Addison's disease, and diabetes insipidus having no such effect on the vessels. The author states that in his opinion these vaso-constrictive substances found in beriberi blood-serum are but an exaggeration of those found in normal blood serum, and that it is very improbable that any substances acting specially on the vessels are elaborated in beriberi. He further states that shortly he will publish some work on the properties of these substances.

P. W. B-S.

**TASAWA (R.).** Experimentelle Polyneuritis besonders bei Vögeln, im Vergleich zur Beriberi des Menschen. [Experimental Polyneuritis in Birds compared with Beriberi in Man].—*Zeitschr. f. exper. Path. u. Therap.* 1915. Jan. 2. Vol. 17. No. 1. pp. 27-46.

The author commences by stating that the two diseases are not the same. He upholds FUNK's theory that bird beriberi is due to a lack of vitamins and is not due to any autogenous or exogenous poison. He states that the only points of resemblance between bird beriberi and human beriberi are the degenerative changes in the peripheral nerves and muscles and the resulting paretic symptoms. Though rice is the staple diet in Japan and therefore the conditions are more or less analogous to those of the bird disease, the author from his observations in many epidemics among fishing men and in the coastal districts is unable to accept the conclusion that deficiency in vitamins is the cause of beriberi. He states that conditions with regard to diet, work, habits of life, age, sex, climate, duration of voyage, etc. always appear to be the same, yet beriberi occurs only in certain places and usually as a regular epidemic. In some years it has a high mortality, in others a low; as a rule only certain groups are attacked while others around remain unaffected and often those receiving subsidiary diet, as beans, fish, etc. are not less, but as highly affected.

From these observations he concludes that "disposition" plays an important role. In Tokio hospital it is not uncommon for the sick to develop beriberi as an intercurrent disease and to recover without change of diet under symptomatic treatment. Though the polyneuritis of birds is very easily cured by the alcoholic fat-free extract of rice bran this, in the author's experience, even when given in large quantities, produces no result in human beriberi. The early emaciation found in the bird and experimental animal disease is very markedly different from that found in epidemic human beriberi. The author however does not deny that polished rice as a chief article of diet may have a connection with an outbreak of beriberi by creating a "disposition" for the disease, but that it is the cause of beriberi he cannot accept. He however recognises that there are human cases which are due to lack of vitamins and similar to the experimentally produced disease, such as the "rice food disease" of infants (quite distinct from infantile beriberi) and probably the sailing ship beriberi of NOCHT. The disease which MOSZKOWSKI produced in himself by subsisting for 230 days on a diet consisting almost entirely of polished rice was probably nothing more than "rice food disease" in an adult and quite different from true beriberi, as the symptoms disappeared in a few days after treatment with rice bran extract.

[Though the deficiency theory of beriberi is not accepted by the author it is recognised to be partly responsible, and wholly causative of the very similar conditions with which it is so closely connected. DARLING and others have shown how gradations from scurvy to beriberi can be traced by clinical and pathological evidences, the whole coming under the deficiency group of diseases. See this *Bulletin*, Vol. 5, p. 107.]

## UNDULANT FEVER.

BASSETT-SMITH (P. W.). **Recent Research relating to Undulant or Mediterranean Fever.** *Jl. R. Naval Med. Serv.* 1915. Apr. Vol. 1. No. 2. pp. 166-180. With 1 map and 2 diagrams.

This interesting paper provides a very complete summary of what has become known as regards undulant fever since 1906, the year in which the Royal Society's Commission presented a final report upon its etiology. It is furnished with a map of the world showing the distribution of the disease and with diagrams (*see* p. 158) comparing its incidence in Malta amongst the Army and Navy and civil population respectively, between the years 1905 and 1912.

After some notes upon the question of nomenclature, and a discussion of the geographical distribution of undulant fever, the author explains the ancestry of the Maltese goat, which is a modified species of the Thebian or Egyptian goat owning *Capra hircus* as its parent stock. He points out that so much is said about infection through drinking goats' milk that there is a danger of forgetting the fact that other ruminants may carry the disease. Further on he notes that in addition to man and the goat, cows, sheep, horses, mules and dogs are liable to natural infection.

It is now known that the *Micrococcus melitensis* possesses very considerable vitality outside the body and, while an infected milk supply is undoubtedly the chief source of the disease, the view that other methods of infection frequently play a part is steadily gaining ground.

As SÉJOURNANT has indicated, while in urban areas infected milk is generally to blame, in rural districts the disease is generally spread by direct infection or inoculation of infected soil or milk.

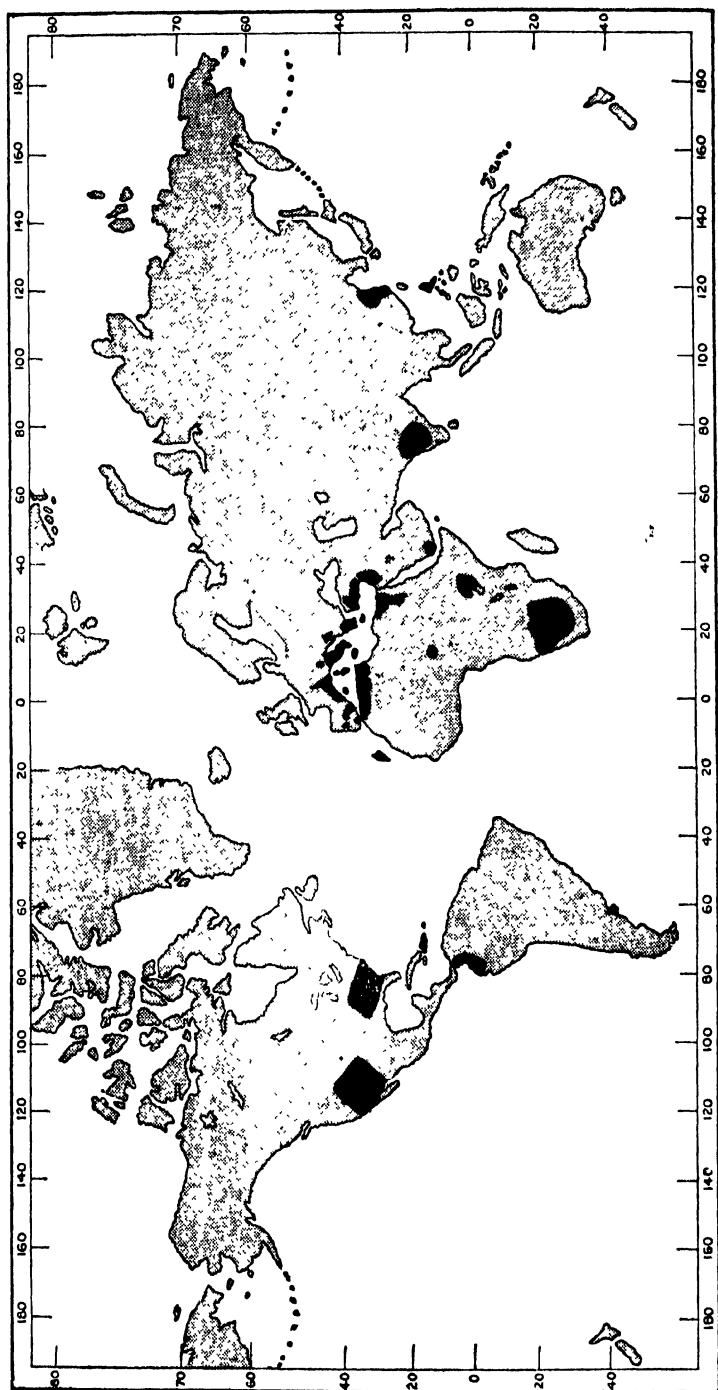
In Corsica, as LEGER has shown, goats may infect dogs and goatmen, women who milk the goat become infected through the hands, and cheese made from the milk and eaten fresh is also a source of infection, for in it the micro-organism can retain its vitality for fourteen days. [This has also been observed in Southern France.]

The part played by ambulant human cases must not be forgotten, the micrococcus being voided in the urine and so affecting soil and outhouses and conveying the disease to those employed in the latter.

Food, fingers and flies are to be considered as possible carriers of the organism. Bassett-Smith believes the latter to be a true coccus though it presents varying appearances under cultural conditions. In old cultures bacillary forms are common and are due to involution.

The infection of laboratory animals is duly considered, the fact that inoculated rabbits do not suffer from a septicaemia being noted, and then the author has something to say on the *paramelitensis* of NÈGRE and RAYNAUD. In this connection he cites the well-known Hyères case which he published in 1913. [See this *Bulletin*, Vol. 1, p. 579.]

Methods of diagnosis are next dealt with, and the lacto-reaction mentioned. Recent work tends to show that in many of the infected goats there is a localization of the organism producing a mammitis without general septicaemia.

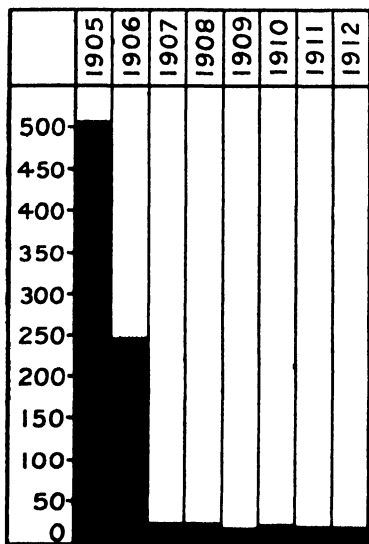
[*Tropical Diseases Bulletin.*P. W. BASSETT-SMITH. *Jl. R. Naval Med. Service.*]

Distribution of Undulant Fever.

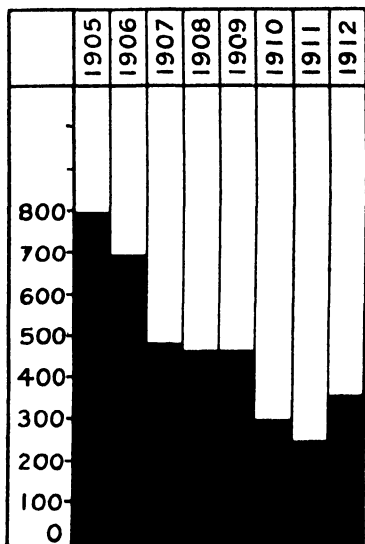
The lacto-reaction used for detecting infected goats, though not always reliable and not to be depended upon alone for prophylactic purposes, is of very great assistance to the sanitary officer, but the occurrence of anomalous reactions must be borne in mind.

At the same time the reaction is a specific one and it is very important to discover the causes of error. Cows' milk in some cases has a tendency to agglutinate the *M. melitensis*, but if certain precautions are taken most of the non-specific reactions may be avoided. The author insists upon the necessity of centrifuging the milk very thoroughly, or using whey; also of heating it for half an hour at 60° C.

In man the diagnostic tests in order of their relative value are:—  
(1) Sero-culture; (2) agglutination; (3) complement fixation; (4) precipitin test; (5) culture of the organism from the urine.



Army and Navy.



Civil Population, Malta.

It is to be noted that in advanced cachetic conditions blood culture will often fail.

The agglutination reaction is considered at some length, and the following rules are given for its technique.

(1) The culture to be used should be proved to be active with known specific sera and should not agglutinate with other sera. A paramelitensis strain would fail to agglutinate in high dilutions with a true undulant fever serum and give rise to a negative error.

(2) As recommended by NÈGRE and RAYNAUD, the heated and unheated serum should be tested, the former cutting out the non-specific agglutinins and preventing a positive error in non-undulant cases.

(3) The test should always be carried to high dilutions, up to 1 in 400, to avoid paradoxical reactions.

The differential diagnosis from a clinical standpoint is often difficult, more especially in the case of young children. As regards treatment, Bassett-Smith says he has found yeast of value. It increases the

polymorphs and reduces the tendency to neuritis which is a feature of the later stages of the fever.

SCORDO's method of treating goats with intravenous injections of perchloride of mercury may be found applicable to human cases. It increases the red cells, haemoglobin and polymorphs, and sterilizes the blood, thus cutting short the fever.

Salvarsan and protargol have been used, and so has a serum obtained from goats inoculated with a nucleo-proteid derived from *M. melitensis*. NÈGRE and SERGENT have had good results with a polyvalent serum, while vaccine are often useful, especially in sub-acute cases. The author suggests the use of polyvalent and of sensitized vaccines and brings a most useful summary to a close with a few remarks on general prophylaxis and on the necessity for a thorough disinfection of excreta and contaminated articles in all cases, whether ambulant or otherwise.

A. Balfour.

**BULLETIN DE L'OFFICE INTERNATIONAL D'HYGIÈNE PUBLIQUE. 1915.**

Feb. Vol. 7. No. 2. pp. 255-299; Mar. No. 3. pp. 485-501.—

**Flèvre Ondulante.** i. By JORGE (Ricardo); ii. By SERGENT (Edm.) & NÈGRE (L.); iii. By DE COTTES (J. Duran); iv. By SANTOLÍQUIDO; v. By NICOLLE (Ch.).

**i. JORGE (Ricardo). Rapporté présenté dans la Session d'avril 1914 du Comité de l'Office Intern. d'Hyg. publique.**

In this long paper the author first describes the wide geographical distribution of the disease. He then gives an historical account of its presence in Portugal. In 1910, chiefly through the labours of BETTENCOURT, it was recognised as being endemic in the country. A coordinated effort was made to find out the most affected parts, and the epidemiological characters, but at first the general practitioners had to be instructed in the clinical characters of the disease, and means of obtaining laboratory diagnosis given to them. It was found that in Estremadura, including Lisbon, there was a large centre and that there were other less affected areas both in north and south. It was evident that the disease had frequently been mistaken for typhoid or malaria, but peculiar fevers had long been recognised and were called by various names, as sweating typhoid, year fever, etc. The seasonal incidence was most from April to October. Throughout Portugal goats are abundant and their milk is used both in the towns and country. The manufacture of cheese, eaten more or less fresh, is a great industry, and through the milk and its products a very great proportion of the infection could be traced. The infected goats are not so much the imported as the indigenous animals. The author however is convinced that infection is not always by ingestion of infected milk and food, but in a proportion of cases is by contact and inoculation methods, and also that man to man infection is fairly frequent. Complete sanitary methods as well as control of the animals are of the utmost importance to prevent the disease spreading. The paper concludes with a bacteriological report by BETTENCOURT on the methods of diagnosis employed for both men and animals, which does not contain any new matter.

ii. SERGENT (Edm.) & NÈGRE (L.). **La Fièvre Ondulante in Algérie.**—*Ibid.* Mar. No. 3. pp. 476-484.

The disease has been known clinically in Algeria since 1895 and was demonstrated bacteriologically in 1904. In 1907 Edm. SERGENT, GILLOT and LEMAIRE studied the infection in the native goats, finding 4·2 per cent. affected. In 1911 NÈGRE and RAYNAUD established the existence of the *M. paramelitensis*, which is probably the same as that called by SERGENT and GILLOT in 1907, *M. pseudo-melitensis*. From the morphological characters it is possible to differentiate strains which are always true cocci from others which are distinctly cocco-bacilli in form. It was shown that some of the infected goats reacted to the *M. melitensis*, others to the *M. paramelitensis*, infection being less common among the Algerian than among the goats of Malta (10 to 50 per cent.), and that the infection is less intense and less lasting among the native goats. Horses, mules, donkeys, and dogs were sometimes infected. The disease spreads through the milk, goat's or human, either by ingestion or by contact. Much stress is laid on the dissemination of the microbe by *dirty hands infecting milk, cheese, and cream*. The goats themselves become infected from their unsanitary surroundings, contaminated by urine, etc. There is no doubt that the disease was brought to Algeria by goats from Malta and Gibraltar. In 1908 the importation of all ruminants from Malta was stopped and since that time the disease has been much less prevalent, but this diminution did not take place in the province of Oran owing to the importation there of infected Spanish goats.

[The morphological differences found in cultures of the *M. melitensis* must be familiar to all who have worked much with these organisms.]

iii. DURAN DE COTTES (J.). **La fièvre ondulante en Espagne.**—*Ibid.* pp. 485-492.

It is uncertain at what date undulant fever first appeared in Spain, certainly more than 100 years ago. In 1902 it was definitely recognised in Barcelona and in 1905 was carefully studied by RAMON y CAJAL. The existence of this fever was probably fairly widespread at that time but few recognised it as such, calling it by other names. It was however most commonly found in places on the coast and was due to infected goats imported from Malta. These animals were greatly prized in Spain for their milking qualities, and though they had been interdicted in Gibraltar they have passed freely up into the country. Infected goats have been found by the author in almost all the provinces and with these human cases always exist. In man the mortality is about 8 per cent. Among the diagnostic measures recommended by the author as of great value is the subcutaneous injection of dead vaccines. The serum and vaccine treatment of the disease is rather fully described, the former being best for acute cases with toxic symptoms, the latter in the more chronic stages.

iv. SANTOLIVUO. **L'Amministrazione sanitaria Italiana sur la fièvre ondulante.**—*Ibid.* pp. 493-497.

The disease is most common in Southern Italy and in Sicily and though it does not cause many deaths it occasions much loss of

time to the working population. It is stated that in Tripoli 35 per cent. of the goats are infected and in Southern Italy 15 per cent. of the cows. Though the use of infected milk is a common cause, the author is convinced that interhuman infection is very important and he quotes the epidemics at Stiava and d'Alghero in support of this view. Milk, excreta, urine, and secretions generally are the sources of infection, widely distributed by unsanitary dwellings and surroundings, the germ obtaining entrance by the digestive, respiratory, cutaneous, conjunctival, or genital routes, most commonly by the former.

**v. NICOLLE (Ch.). Exposé resumé des travaux de l'Institut Pasteur de Tunis sur la fièvre méditerranéenne.—*Ibid.* pp. 498-501.**

On taking up the directorship of the Institute the author first had to demonstrate the presence of undulant fever in Tunis. When this was done the various diagnostic methods, particularly those relating to agglutinins, were carefully worked out and precise rules were laid down to avoid errors from many causes; these are now well known. A total of 2,600 goats was systematically examined; of these 4 per cent. were found to be infected, those from Malta four times more often than the indigenous ones. The Government therefore stopped the importation of animals from Malta. Various experiments were carried out to show the susceptibility of various domestic and other animals. A serum was prepared which has a marked curative action, cutting short the disease when used in an early stage of the fever; this has been supplemented by vaccines also prepared in the Laboratory. The author finally emphasises the great danger to experimenters working with the micrococcus, no less than four persons having contracted the fever through manipulations in his laboratory.

[This has been experienced in almost every laboratory.]

P. W. Bassett-Smith.

**CANTIERI (Collatino). La sieroterapia della febbre mediterranea.—*Riv. Crit. Clin. Med.* 1915. Vol. 16.**

May 8.	No. 19.	pp. 289-295.	With 2 charts.
„ 15.	„ 20.	„ 305-313.	„ 8 „
„ 22.	„ 21.	„ 321-326.	

The extension of undulant fever in Italy is shortly dealt with, but the main part of this paper is occupied by a description of the therapeutic action of the serum of Trambusti-Donzello, brought forward in 1910. Twenty cases previously treated by various authorities are shortly described, the results in most of the cases being good; the quantities employed varied from 5 to 60 cc., the usual dose being from 5 to 10 cc. given at intervals of two, three, or five days. The author describes in detail fifteen cases of his own treated with the serum. These were of different degrees of severity and duration, as seen by the temperature charts given; the initial injections were employed as early as the tenth day in one case, and after two years in another. At first he used 10 to 20 cc., but later higher doses were given, up to 40 cc. In ten out of the fifteen cases treated the total amount used varied from 60 to 150 cc. Generally speaking, the earlier



the treatment the more effective, and the longer the case the more serum required. The inoculations were given at short intervals and were then stopped, but with relapses of the fever they had to be renewed and anaphylactic reactions occurred in several cases: for instance, in case 6 after the patient had received 70 cc. of serum and thirteen days after the first series, when the symptoms were severe. Some of the reasons for unsuccessful results are, absence of sufficient complement in the serum of the patient to combine with theamboceptor in the serum, insufficient quantity of serum for the dose, and irregular spacing of the doses, and possibly the quality of the serum as supplied for use.

The conclusions given are—

1. The serum can be recommended for all cases of undulant fever unless specially contraindicated.

2. The amount given should be large, 60 to 80 cc. in twenty-four hours.

3. The treatment will gradually reduce the temperature but after a sub-febrile period a new cycle may develop. The doses should follow one another *quickly*, equal or slightly smaller in size than the initial one; then good reactions will probably be produced. The anaphylactic phenomena require further detailed study in the laboratory.

[In a disease running such a variable course as undulant fever it is very difficult to determine with certainty whether the therapeutic agent has really been effective. A study of the cases and temperature charts reported does not strongly favour this method of treatment and the danger of anaphylactic reactions is a serious drawback.]

P. W. B-S.

**VIRGILLO (Francesco). Un nuovo metodo per la reazione agglutinante del latte delle capre infette di micrococco melitense.** [A new method for the agglutination reaction in the milk of goats infected with *M. melitensis*].—*Pathologica*. 1915. Mar. 1. Vol. 7. No. 152. pp. 116–120.

The various methods of ZAMMIT, PULVIRENTI, PISANI-SANTI, and CANTIERI, for determining the specific agglutinations of the *Micrococcus melitensis* in milk are described; of these that of ZAMMIT is most commonly used, being the more easily applied; it is, however, far from perfect. The author's method is a combination of precipitation and agglutination and though it is more difficult to carry out the results agree more closely with the blood serum tests. The serum for the precipitating is obtained by immunising a rabbit with intra-peritoneal inoculations of goats' milk which has been autoclaved for one hour on two days, the inoculations of 12 to 24 cc. being given every second day. The milk to be tested is divided into two parts, one part for the ZAMMIT's test and one for the precipitin method. For the latter the following proportions are used—0·5 rabbits serum, 0·1 milk, and 0·2 water; the results are read off the next day. The clear fluid free from casein is then used for the agglutination test in dilutions of 1 in 10, 1 in 20, 1 in 50 with an emulsion of the *M. melitensis*; the mixtures are put up in capillary tubes and the results read off in 24 hours. Using an

artificially immunised goat the results were found to agree very closely with the serum tests, but both showed marked variations from day to day. Thirty samples of goats' milk were examined by this method and by ZAMMIT's; in 17 the results were in agreement. In his conclusions the author admits that his method is more laborious, but he claims for it that there are fewer errors and that the results are more easily interpreted.

P. W. B-S.

VIRGILLO (Francesco). **La reazione agglutinante del sangue nella infezione melitense.**—*Policlino.* Sez. Prat. 1915. May 2. Vol. 22. No. 18. pp. 589-594.

The contradictory results in the diagnosis of undulant fever with agglutination tests and the presence of positive reactions in tubercular and other infective conditions, which have frequently been reported, caused the author to make some personal observations.

He quotes two cases of undoubted undulant fever, in both of which in the early period of the disease agglutination up to 1/1000 was obtained, and after two years in the first and four years in the second case the serum still reacted positively at 1/100 but not 1/200. These low reactions he considers non-specific. He states that for accurate diagnosis the amount of agglutination oscillates between 1/200 and 1/500 and that lower dilutions are unreliable.

[A large number of references are given, all but two of which are prior to 1912. There is no mention of the observations of NÈGRI and others, which show that the non-specific agglutinins are to a great extent cut out by heating the serum to 57° C. for half-an-hour.]

P. W. B-S.

LUCIBELLI (G.). **Contributo allo Studio sulla Virulenza del *Micrococcus melitensis*.**—*Riforma Med.* 1914. Sept. Vol. 30. No. 36. pp. 988-991.

A short historical account of the etiological factors which favour the diffusion of undulant fever is given. It is pointed out that the vitality and virulence of different strains of the micrococcus vary considerably and that the virulence can be exalted by passage and lowered by culture in the laboratory. The author carried out a number of experiments with rabbits by inoculating them intraperitoneally with a strain recently isolated. From these he drew the following conclusions:—The *M. melitensis* acquires a high degree of virulence when cultivated in goat's milk. The virulence is preserved by passage through experimental animals, but not for long. The addition of 2, 4, or 6 per cent. of the milk to media does not increase the virulence. Cow's milk has not the same property as goat's milk. Other organisms as *B. typhosus*, *B. coli* and *M. para-melitensis* do not alter in virulence when cultivated in goat's milk. It is possible that by the use of goat milk cultures and animal inoculations a high degree of immunization might be obtained.

[The experiments are interesting but are too few in number to ground conclusions on, and they do not appear to have been repeated. The rabbits died in 12-14 hours after inoculation with milk cultures and a first blood culture; but survived when inoculated with a broth subcultured from the original broth culture, and when inoculated with a goat milk culture of *M. para-melitensis*. No mention is made of EYRE's work on exaltation of virulence by intra-cerebral inoculation.]

P. W. B-S.

de NUNNO (R.). Ueber die Wirkung des Mikkokokkus von Bruce (*Melitensis*) und seiner Toxine auf das periphere und zentrale Nervers system. [The Action of the Micrococcus of Bruce (*Melitensis*) and its Toxins on the Central and Peripheral Nervous Systems.]—*Deut. Arch. f. Klin. Med.* 1914. Vol. 116. No. 304. pp. 275-294. With 4 plates.

The author gives an historical survey of the disease, in which he points out that very little has been done to investigate the effect of the *M. melitensis* and its toxin on the nervous system. He therefore decided to study the nervous system in the disease. He experimented on rabbits of equal weight, with various strains of the organism which were not very virulent; the cultures were injected either alive or dead, under the dura, intravenously, or into the cord. He gives a detailed account of the results obtained in three rabbits, one injected with a living culture under the dura, another with double the amount of living culture intravenously, and the third with a dead culture under the dura. The effects were more or less similar. After subdural injections of living cultures, changes developed in the vascular tissue—hyperaemia, degeneration of the vessel walls and tendency to thrombus formation; in the central nervous system he found a decrease in the number or injury to the nerve cells with loss of mitochondria, chromatolysis, karyolysis, pyknosis, atrophy and breaking up of nerve fibrils and reticulum, with a leucocyte infiltration. These changes were most marked in the cerebrum and medulla, less evident in the cord, and entirely absent in the cerebellum and peripheral nerves. After intravenous injections the changes were similar, but the damage was greatest in the medulla and cord, the peripheral nerves were also severely affected, the cerebellum was not affected. With subdural injections of sterilised cultures (namely of endotoxins) the same changes were found but they were most marked near the site of injection.

From these experiments it is evident that lesions of the central and peripheral nervous systems can be experimentally produced by the *M. melitensis*. As the injected organisms were of low virulence they produced a protracted disease inducing changes in the nervous system approximately similar to those found in man. Injections into the brain did not show any marked pathological power as the animals survived for a long time and showed generally a chronic course of the disease; this is in accordance with clinical observations that in man nervous symptoms are comparatively rare. On the other hand the histological changes found explain why neuritis is so common, depending

upon the destructive action of the *M. melitensis* on the peripheral nerves. The damage to the medulla shown experimentally also explains and confirms the observations of bulbar symptoms made by GROCCO. The experiments also show that a great part of the damage is due to the toxins, since the dead cultures produced the same changes as the living cultures. There is therefore no doubt that the *M. melitensis* can cause marked nervous disturbances, and that the nervous symptoms are based upon special and not infrequently severe anatomical changes in the central and peripheral nervous systems.

P. W. B-S.

## SLEEPING SICKNESS.

DA COSTA (B. F. Bruto), SANT'ANNA (J. Firmino), DOS SANTOS (A. Correia) & ALVARES (M. G. de Araujo). **Relatorio Final da Missão da Doença do Sono da Ilha do Príncipe (1912-1914).** [Final Report of the Sleeping Sickness Commission of the Island of Príncipe].—*Arquivos de Hig. e Patol. Exot.* 1915. Mar. 30. Vol. 5. 262 pp. With 3 maps, 7 plates & 68 figs.

This interesting volume contains the final report of the Commission which has succeeded, at any rate for the moment, in completely suppressing sleeping sickness in the Portuguese island of Príncipe, off the West Coast of Africa.

Príncipe is one of two islands which lie in fairly close proximity to one another, the second one being San Thomé, where sleeping sickness has never prevailed. They are both given up to the cultivation of cocoa, and the ravages made at one time by sleeping sickness in Príncipe threatened to bring the industry to an end. Príncipe measures about 17 kilometres from north to south and about 10 kilometres from east to west, its total area being about 126 square kilometres. It is distant about 200 kilometres from the coast of Africa and 130 kilometres from the sister island of San Thomé. Both islands are volcanic in formation, and have a tropical climate, Príncipe being situated only 1.4 degrees north of the equator. As is shown in the illustrations attached to the report, the southern portion of Príncipe is mountainous and in this region sleeping sickness has never prevailed. North of the mountain chain, however, the land falls gradually to the sea levels and is everywhere covered with tropical forest intersected with rivers, except where the ground has been cleared for cultivation. The majority of the streams take their rise in swamps, and run through tunnels of vegetation to the sea. It is along these streams and on the borders of the sea adjoining their mouths that the *Glossina palpalis* is, or was to be found, its distribution being clearly indicated on a map.

Príncipe in former times was a depot for the slave trade, the slaves being generally brought in boats from the nearest point of the continent and landed on the north side of the island. Imported cattle were also landed at the same point. Sleeping sickness is supposed to have been imported into Príncipe about the year 1825, the *Glossina* having travelled along with the slaves and the cattle from the mainland. San Thomé, not having been used in the same way as a depot, escaped the disease. The total population of Príncipe in the year 1902 amounted to just over 4,000 inhabitants, but as a result of the ravages of sleeping sickness, the population had fallen by the year 1907 to 3,000 only, in spite of the continued importation of labourers from the mainland. The general mortality for the first of these years amounted to 221 per thousand, of which sleeping sickness accounted for 61 per thousand, or nearly one-third. In 1906 the general mortality amounted to 196 per thousand, and that from sleeping sickness to 83 per thousand, being an even higher proportion. It is not wonderful that the cocoa industry of the island was menaced with extinction.

Various scientific and medical commissions were appointed and duly reported, but it was not for some years that the problem could be properly tackled, for want of both means and labour. Eventually a corps of labourers was formed from prisoners brought from San Thomé and from the mainland, and by means of moveable camps a system of clearing and drainage was instituted throughout the island, combined with a fly-catching crusade against the *Glossina* by means of bird-lime. The result has been, as is shown in Map III, the complete extermination of the fly. At the same time the whole of the inhabitants of the island, whose number had risen again by 1913 to nearly 5,000, were subjected to periodical blood examinations once in every three months, and every infected individual was at once segregated in hospital and treated with atoxyl.

An interesting feature in the case of Principe was the existence in the island of a large number of wild pigs, originally liberated by the settlers, whose distribution in the woods closely corresponded with that of the fly. Evidently these animals, along with a number of wild dogs, were the principal reservoirs of the trypanosome, and had to be destroyed. The indigenous fauna of Principe is limited in character, and consists of one species of monkey (*Cercopithecus mona*), a civet cat (*Viverra civeta*), field rats and house mice, and frugivorous and insectivorous bats, besides the usual assortment of tropical birds and reptiles; and the opportunity was taken of thinning considerably the numbers of civet cats and monkeys, in the interests of the cultivators, at the time of the forays against the dogs and pigs.

For the purpose of catching the flies, ten men out of every hundred of the brigade of workers were specially dressed in white clothes with a suitable headgear. They carried on their backs a square of dark coloured cloth which was spread with bird-lime, and they were set to walk about in twos in the clearings, so that each man might pick off the leaves that stuck to his companion's back. The most delicate men of the gangs were set to this task. At the end of the day the flies caught were detached from the cloths, counted and burnt. As has been shown in a table already published in this *Bulletin* (Vol. 4, p. 354) the total number of flies thus caught in the three years 1911, 1912 and 1913 amounted to nearly 170,000. The bird-lime used was at first manufactured locally and was composed of a mixture of palm-oil and resin, which had the inconvenience of drying rapidly; and it was eventually replaced by a supply from England, one of the best samples for the purpose being that manufactured by Messrs. TUNBRIDGE and WRIGHT, of Reading.

Space will not permit of a further analysis of this complete and valuable report.

J. B. Nias.

DUBOIS (A.) & van den BRANDEN (F.). La réaction de Boveri dans la Trypanosomiase humaine.—*Bull. Soc. Path. Exot.* 1915. May. Vol. 8. No. 5. pp. 261-266.

A description of the reaction is given.\* One cc. of the cerebrospinal fluid to be examined is placed in a small test tube and then 1 cc. of.

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\* See *Münchener medizinische Wochenschrift.* 1914. June 2. p. 1215.

a 1 per cent. solution of potassium permanganate is run slowly down the side of the inclined tube so that the column of violet coloured permanganate remains on the top of the cerebrospinal fluid when the tube is subsequently held vertically. In pathological cases the fluid at the junction of the two columns becomes more or less yellow. This "zonal" reaction is however less well marked than the "global" reaction which is obtained by shaking the tube so that the fluids mix. When the reaction is positive the colour changes from violet to yellow in some seconds or minutes. The value of the reaction is proportional to its rapidity. It is marked when it appears in less than 2 minutes, moderate in 3 or 4 minutes and feeble in 5 or 6 minutes. Beyond these limits it is negative, as all cerebrospinal fluids will reduce permanganate in time.

The author examined the "reaction global" in 62 cases—the "reaction zonal" is less satisfactory and was negative in almost every instance. The results are given in two tables. In the 21 cases recorded in the first table the amount of albumin and the relative number of lymphocytes are also given, whilst in the 41 cases mentioned in the second table the degree of lymphocytosis only was determined.

It was found that of the 21 cerebrospinal fluids which contained more than 100 lymphocytes per cmm., 20 reduced the permanganate rapidly whilst in the other the reaction was moderate; of the 8 which contained between 50 and 100 lymphocytes per cmm., 2 gave a strong reaction, 4 a moderate reaction and 2 a feeble reaction. In the 17 instances where the amount of albumin reached  $\cdot 40$  per 1,000 the reaction was strong in 12 cases and moderate in the remaining 5, whilst in the 4 instances where the amount of albumin was less than  $\cdot 40$  per 1,000 the reaction was never rapid.

A number of observations were made to determine what element in the cerebrospinal fluid caused the reaction. The lymphocytes obtained from the cerebrospinal fluid by centrifugation did not cause reduction of the permanganate, neither did the red cells which are sometimes present through the unavoidable injury of a vessel. On the other hand various albuminous fluids such as egg white, Witte's peptone and human serum gave the reaction. The conclusions are:—

1. The reaction of Boveri is given by sleeping sickness patients in the nervous stage of the disease.
2. It is usually absent or but slightly marked in the first stage of the disease.
3. It appears to be due to the presence of proteids and perhaps to them alone.

W. Yorke.

AUBERT (P.). *Essais de traitement de la trypanosomiase humaine par les dérivés du Diaminoarsénobenzène O<sub>1</sub> et OK<sub>1</sub>.*—*Bull. Soc. Path. Exot.* 1915. Apr. Vol. 8. No. 4. pp. 169–172.

Reference is made to previous work [see this *Bulletin*, Vol. 4, p. 258 and Vol. 5, p. 297] on the therapeutic activity of the two derivatives of diaminoarsenobenzene O<sub>1</sub> and OK<sub>1</sub>, wherein it was shown that these products possess at least as great a trypanocidal power as arsenophenylglycin and that they are more stable and less toxic.

In the present paper the value of the drugs in human trypanosomiasis is examined. The products were dissolved in sterile distilled water, the strength of the solutions used varied between 1 in 30 and 1 in 40; as a general rule the solutions after filtration were injected intravenously. In a limited number of cases the drugs were given subcutaneously or intramuscularly; no local reactions comparable in intensity with those provoked by arsenophenyglycin were observed. Owing to their relatively great stability it was found possible to use the contents of ampoules which had been opened for several days and simply closed by a rubber plug. The dose administered was .02 gm. to .025 gm. per kilo of body weight.

Marked intolerance to the products—more especially to  $O_1$ —was observed in certain of the patients; the symptoms, which became manifest either at the moment of injection or at any time up to some hours after injection, were bilious vomiting and a bilious diarrhoea which persisted for several days, a slowing of the pulse, profuse sweats and sharp pains in the epigastrium.

Details of the treatment of 23 patients with  $O_1$  and 20 with  $OK_1$  are given in tables. Both drugs caused the speedy disappearance of trypanosomes from the glands and peripheral circulation. Large glands subsided in some days under the influence of a single dose whilst in one case, in which was considerable hypertrophy of the spleen, there was complete regression of the organ in about a week. Increased frequency of the pulse rate was not observed in patients treated with these products as is usually the case in patients who have received atoxyl; in this respect  $O_1$  and  $OK_1$  resembles arsenophenyglycin and salvarsan. The derivatives  $O_1$  and  $OK_1$  appear to have the same therapeutic activities, but prolonged observation and multiplication of the cases treated must decide whether the drugs are of real value in the treatment of sleeping sickness.

W. Y.

van SACEGHEM (R.). **Expériences sur le traitement des trypanosomiasés animaux. Appendice—L'Émétique en injection intramusculaire dans le traitement des trypanosomiasés animales.** *Bull. Soc. Path. Exot.* 1915. May. Vol. 8. No. 5. pp. 339-348.

At the Brussels School of Tropical Medicine the author carried out various experiments on the therapeutic action of atoxyl and emetic on infections caused by *T. congolense* and by *T. brucei* (Uganda).

Two guinea-pigs infected with *T. congolense* were treated, the one with emetic and the other with atoxyl; similarly two others infected with *T. brucei* (Uganda) were treated respectively with emetic and atoxyl. The drugs were administered subcutaneously; details of the dosage and of the results of examination of the peripheral blood are given. From these four experiments the author concludes that neither emetic nor atoxyl is of any real value in the treatment of infections caused by *T. congolense* and *T. ugandae*.

In the next series of experiments five guinea-pigs—two infected with *T. congolense* and three with *T. ugandae* were treated with both drugs combined, atoxyl-emetic; details are set forth in tables. One guinea-pig infected with *T. congolense* was cured by a single injection of the combined drugs; the other animal had three relapses before



the cure was completed; after each relapse an injection of the drugs was given. Of the three animals infected with *T. ugandae* the first had one relapse and was cured by two administrations of the drugs, the second had two relapses and was cured by three injections, and the third had five relapses and died after the sixth administration of the atoxyl-emetic. The author concludes that very good results are obtainable with the combined treatment in small animals infected with these strains.

Referring to the administration of atoxyl and emetic to large animals, the author points out that if performed aseptically subcutaneous injection of atoxyl is not accompanied by local irritation whereas subcutaneous injection of emetic causes violent local reaction with oedema, inflammation and sometimes necrosis of tissue. Emetic has been given intravenously in man with advantage but this method is not possible in large animals. Consequently van Saceghem tried intramuscular injection of solutions of emetic and found that good results were obtained by this method—less rigid asepsis is required, there is little pain and no local reaction. Details of the technique are given.

Regarding the rapidity with which the peripheral circulation is sterilised, the author found that in the case of *T. congolense* an injection of emetic caused the parasites to disappear from the blood of a guinea-pig in 5 minutes and in the case of *T. ugandae* in 11 minutes. Dealing with the question what gives rise to the relapse the author states that there are two hypotheses:

1. That there are resistant forms.

2. That certain trypanosomes are protected from the action of the medicament by their position in the organism, *e.g.* bone marrow, central nervous system.

He considers the second of these to be the more probable.

The author found that in combination with atropine he could administer larger doses of emetic without producing grave symptoms of cardiac depression; thus to a dog of 25 gm. he was able to give 1 cgm. of emetic per kilo without causing symptoms.

In an appendix the author states that he has put to the test his method of intramuscular injection of emetic in the treatment of animal trypanosomiasis. His first experiments were performed on small laboratory animals; the results were so satisfactory that he decided to apply the method to larger animals. Details are given of the treatment of a cow infected with *T. congolense*. The conclusions are:

1. The administration of emetic intramuscularly is superior to any other method; it is not followed by local reaction.

2. It is always advisable to use emetic and atoxyl in association.

W. Y.

WEHRBEIN (Heinrich). **Conglutination in the Diagnosis of Dourine (Trypanosomiasis of the Horse).**—*Jl. Infect. Dis.* 1915. May. Vol. 16. No. 3. pp. 461-465.

The author refers to the work of STRANIGG, who used the phenomenon of conglutination in the diagnosis of glanders. A brief description of the method is given. The system used by the author was ox serum,

fresh horse serum as complement, and sheep blood. The best titer was found to be '1 cc. of ox serum, '1 cc. of horse serum and '1 cc. of a 5 per cent. suspension of sheep blood. Pure trypanosomes and an emulsion of spleen of an infected rat were used as antigen but the latter proved unsatisfactory. The method of titration of the ox serum, complement, and antigen is given in tables.

Experiments were made with 19 dourine sera ; with one exception the results were the same as with complement fixation and in some cases the same as with agglutination. Two of the 30 normal sera tested gave a doubtful result. The conclusion is :

The conglutination method can be used for the diagnosis of dourine ; but it is more sensitive to faulty technique and hence more difficult to employ than the usual complement fixation method.

W. Y.

DELANOË (P.). **Des variations du pouvoir infectieux et de la virulence de *Trypanosoma dimorphon*, L. et M. (Troisième note).**—*Bull. Soc. Path. Exot.* 1915. May. Vol. 8. No. 5. pp. 314-331. With 1 fig.

This is a continuation of the author's previous work on the pathogenicity of *T. dimorphon* [this *Bulletin*, Vol. 3, p. 253 and p. 540.] The strain *T. dimorphon*, S.C., with which this paper deals, was isolated from sheep at Sidi Coulibaly in the Ivory Coast. Delanoë found that *T. dimorphon* S.C. was not inoculable into either the guinea-pig or white rat ; this applied to the trypanosome from the original sheep and also after its passage through a kid or a goat or even after it had been passed through wild rats, *Golunda campaneae*. Even multiple and massive, intraperitoneal and intravenous, injections failed to infect the guinea-pig and white rat. These animals exhibit a complete natural immunity.

This immunity of the white rat is the more remarkable as the virus is highly pathogenic for the wild rat, *Golunda campaneae*, which is common in the Ivory Coast. Of 21 white rats inoculated not a single one became infected, while of 23 *Golunda campaneae* 22 contracted a severe infection and died, a single drop of blood sufficing to infect. The trypanosome sometimes multiplies to such an extent in *Golunda campaneae* that the blood became discoloured.

*T. dimorphon* S.C. did not appear to be infective for other grey rats found in the neighbourhood of Bouaké ; thus of four species of rodents—the white rat, *Golunda campaneae*, *Arvicanthus niloticus* *Richardi* and *Mus concha*—*Golunda campaneae* alone is susceptible.

The author concludes that there are in nature strains of *T. dimorphon* which are capable of infecting a given rodent, but unable to infect other allied species. In order therefore to obtain the best chance of isolating *T. dimorphon* (Laveran and Mesnil) in rodents, it is necessary to inoculate at the same time as large a number of species of rodent as possible.

The strain *T. dimorphon* S.C. was not infective for either *Cercopithecus callitrichus* or a young native dog ; massive intraperitoneal injections of the virus failed to infect either animal.

In conclusion the author states that in his opinion the experiments he has conducted are not sufficient to exclude the possibility of infecting the guinea-pig or white rat with *T. dimorphon* S.C. In order to decide

the point it will be necessary to make further observations especially on the effect of passing the virus through bovines and equines.

W. Y.

**YAKIMOFF (L.). A propos de l'identification des trypanosomes russes.**  
—*C. R. Soc. Biol.* 1915. June 11. Vol. 78. No. 10. pp. 303-306.

By means of the biological test the author attempted to identify a number of trypanosomes found in Russia. He immunised goats against several of the strains and then examined the protective power of the sera of the immunised animals for the various strains. He reached the following conclusions:—

1. The trypanosomes of dourine—Russian and Algerian—are identical.
2. The trypanosome infecting asses in Boukhara is identical with that infecting camels in Boukhara and Samarkande.
3. The trypanosome causing dourine in Russia is identical neither with that found in camels and asses in Boukhara nor with *T. brucei*.
4. The trypanosome of asses in Boukhara is not identical with *T. brucei*.

W. Y.

**JAKIMOFF (W. J.) & WASSILEWSKY (W.). Sur les changements ayant lieu dans le sang du cheval à la suite de l'infection avec le trypanosome des chameaux du Turkestan.**—*C. R. Soc. Biol.* 1915. June 11. Vol. 78. No. 10. pp. 309-312.

In this paper the authors record changes in the blood of a foal inoculated with a trypanosome which had been isolated from an infected camel in Turkestan [see previous paper summarised above.] The foal lived 81 days after inoculation. Before injection the temperature of the animal was 36·9° to 38·4° C.; during the infection the temperature was always raised and on some occasions it was over 40° C. Trypanosomes were seen in the peripheral blood for the first time on the twelfth day.

The following changes in the blood were noted:—

**Red Cells.** Before infection their number was 8,520,000 per cmm, on the 74th day of the disease 2,008,000 per cmm.; other changes noted were agglutination, polychromatophilia, and the presence of normoblasts.

**Haemoglobin.** During the course of the disease the amount of haemoglobin in the blood fell from 80 per cent. to 45 per cent.

**Colour index.** During the first half of the disease this was below 1; the day before death it had risen to 1·8.

**White corpuscles.** Before infection these numbered 10,207 per cmm.; a day after infection their number increased, and then followed oscillations. There were four periods of leucocytosis.

1. Initial period which only lasted four days.
2. A second short period coinciding with the appearance of trypanosomes in the blood.
3. A third longer period of 39 days.
4. A fourth period which lasted from the 70th day till the time of death.

*Relation between number of white and red corpuscles.* Before infection this was 1 to 840 ; during the first half of the disease it was 1 to 1.240 and during the second half 1 to 112.

*Lymphocytes.* In the early days of the infection these comprised 70.3 per cent. ; after oscillating they fell during the final stage to 21 per cent. Whilst the number of lymphocytes was at its maximum the neutrophil polymorphonuclear leucocytes formed only 7 per cent. of the total leucocytes. The relatively large proportion of eosinophils (6.5 per cent.) can perhaps be explained by the presence of ascarids in the intestine. The remaining leucocytes were not affected by the injection.

*Formula of Arneth.* During the first period there was a temporary diminution of the corpuscles containing 2 nuclei (lobes), the number of cells containing 3 nuclei began to increase, whilst those containing 4, 5 and 6 nuclei increased slightly. In the second period the number of corpuscles containing 2 and 3 nuclei increased and of those containing 4, 5 and 6 nuclei decreased.

The curve of leucocytolysis varied inversely with the total number of white corpuscles, commencing with the figure 5.5 per cent. and reaching a maximum of 36.3 per cent.

*Alkalinity of the blood.* This diminished from .58455 before infection to .25980 on the 74th day.

The morphological change in the blood can then be summarised as follows :—1st, oligocythaemia, 2nd, oligochromhaemia, 3rd, lymphocytosis, 4th, the formula of Arneth is displaced towards the left, and 5th, the alkalinity of the blood is diminished.

W. Y.

YAKIMOFF (W. L.) & MARMER (R.). *Les changements du sang provoqués par l'infection du chien avec le trypanosome des chameaux du Turkestan.*—*C. R. Soc. Biol.* 1915. June 25. Vol. 78. No. 11. pp. 343–345.

A dog was infected with the trypanosome obtained from a camel in Turkestan [see previous paper summarised above] ; death occurred 45 days after inoculation. The number of red corpuscles, which was before inoculation 6,018,000, diminished progressively falling at the time of death to 2,728,000 ; polychromatophilia and the presence of normoblasts was noted.

The white corpuscles numbered 12,548 before infection ; the following changes were observed : Firstly a primary leucocytosis ; secondly the number of leucocytes was almost normal, there being a tendency to leucopaenia ; and thirdly a secondary leucocytosis. The lymphocytes and neutrophil polymorphonuclear cells played the chief part in this variation in the number of leucocytes ; there was an initial diminution in the number of lymphocytes, then an increase, and finally a second diminution. The converse occurred in the case of the polymorphonuclear leucocytes.

The formula of Arneth showed a displacement to the left.

W. Y.

- i. LAMBORN (W. A.). **A Preliminary Report on the Problem of controlling *Glossina* in Nyasaland.**—*Bull. Entomol. Res.* 1915. June. Vol. 6. Pt. 1. pp. 59-65
- ii. **Observations on *Glossina morsitans* in Northern Rhodesia.** [EMINSON (R.A.F.).]—*Ibid.* Mar. Vol. 5. Pt. 4. pp. 381-382.
- iii. TURNER (R. E.). **A New Species of *Mutilla* Parasitic on *Glossina morsitans*.**—*Ibid.* p. 383. With 1 text fig.

i. The author's first aim was to discover a small isolated fly area such as those described as "primary fly centres" by SHIRCORE [see this *Bulletin*, Vol. 3, p. 427], with a view to carrying out experiments in the clearing of bush. He therefore proceeded to the area in which SHIRCORE described these centres and examined two before the rains and two subsequently. In the region of one fly was caught over a distance of eight miles from east to west and ten from north to south; in the case of the other centres the results were similar. He was not able to obtain any evidence of the natural splitting up of the northern portion of the fly area in the dry season into two small localised patches, as described by SHIRCORE, and in the southern portion the two so-called primary centres were continuous with each other and with the northern portion of the area. He goes on to say that undoubtedly the fly is more concentrated in this district in the dry season than in the wet, coincident with the greater concentration of the game which then takes place. This is due to its limitation to the areas where shade, water and grass are to be found. "It seems a natural corollary that the fly which, so far as has been ascertained at present, is entirely dependent on the game, should concentrate at the same time." He has not been able to discover that the primary centres form localised breeding grounds, as was surmised by SHIRCORE.

Experiments were conducted to determine the range of flight of *Glossina morsitans*. A total of 920 flies was marked by the method of snipping off a foot through the middle of the metatarsus. The results are shown in a table. Evidence was obtained of ten flights of five miles, and of one flight of not less than ten miles back to the locality from which the flies were originally taken. No flies were fed previous to release. The author proposes to continue these experiments, using also flies which have been well fed before release. Of 2,460 *Glossina morsitans* captured in November and December 2,040 were males and 420 females.

The experiment was made of placing a goat in a wire mosquito-proof cage, the outer side of the cage and the under sides of branches of trees near by being smeared with bird lime. Eight flies were taken in the course of seven days. When the goat was removed and paraded up and down it was much assailed by the flies. Experiments were made in the use of English bird lime spread on various materials placed on the backs of natives. The results are tabulated. The experiments were too few for definite conclusions to be drawn, but light brown paper seemed as effective a material as any.

The experience of the author is that the faster one moves the more one is pestered by flies, so that now he invariably walks rather than cycles in a fly area. The examination of 43 following flies showed

that all were males. Flies were observed to follow a distance of two-and-a-half miles over the open plain and in one place a distance of five.

ii & iii. As regards breeding places, in country otherwise suitable no favoured breeding places have been found in any localities in which there was any depth of sandy soil or in which there was dense growth of long grass.

The favoured area is described as being "uniformly covered with forest trees; very little grass grows amongst the trees, and that little is short; the soil is of a sandy gravelly nature and very thin, merely covering the underlying granite which crops out in places. The surface of the ground shows a gentle slope in a north-westerly direction to a vlei [open, moist, low-lying land] in which a little water stands in the wet season, but which is completely dry at this season [mid-winter]. I cannot say that I have noticed much spoor of game, except some impala and warthog; certainly I should not say that there was any more game than in the surrounding country, if as much. The breeding places which yielded the greatest number of pupae and empty pupa-cases were situated near the path; the fly had evidently been feeding on game, or more probably human beings, preparatory to depositing their larvae."

During May 1914 300 flies were examined to see on what they had fed. Recognisable blood was found in 43—in 41 cases mammalian and in 2 non-mammalian. In a batch of 258 collected *Glossina* pupae there emerged from one puparium a parasitic wasp of the genus *Mutilla*. The wasp had broken open the puparium in precisely the same way as would the fly itself. Seven of the unhatched pupae were opened and two found to contain larvae of the parasite. From the 77 remaining puparia two males and eight females of the *Mutilla* were bred out. A specimen forwarded by Mr. DOLLMAN which reached the British Museum is described by Mr. R. E. Turner as a new species under the name of *Mutilla glossinae*. In addition to this parasite Eminson obtained 35 specimens of a Chalcid from a single tsetse pupa.

A. G. B.

**OUZILLEAU (F.). Rapport d'ensemble sur la maladie du sommeil dans le Bas-M'Bomou (1912-1913).—*Bull. Soc. Path. Exot.* 1915. Apr. Vol. 8. No. 4. pp. 178-198.**

This paper concludes the report of the author on sleeping sickness in Bas M'Bomou, the first portion of which has already been summarised [see this *Bulletin*, Vol. 5, p. 408].

The author gives an account of his itinerary and of the manner in which the population was examined for trypanosomiasis. On his arrival at a village all the inhabitants were assembled and ranged in six groups according to sex and age—men, women, youths, maidens, small boys and small girls. The number in each group was then ascertained and each individual examined. In view of the large number of persons to be examined inspection and gland palpation were relied upon. About 80 per cent. of the cases seen exhibited distinct clinical signs of the infection—typical facies with or without enlarged cervical glands; the remaining 20 per cent. were doubtful clinically but they had enlarged glands resembling those of trypanosomiasis. The former class were declared infected without further examination, trypanosomes being searched for in the latter class only. In discussing the errors of diagnosis the author mentions other causes of glandular enlargement in children and adults.

Successive visits permit of the cases being re-examined; thus in the Hetmann district 1,529 of a total of 1,752 patients have been re-examined. Of these 1,529 cases, 328 have been seen twice, 621 three times, 563 four times and 17 five times.

The treatment is described. A 10 per cent. solution of atoxyl was made and sterilised by boiling; as soon as it had cooled it was injected under the skin of the flank of the patients who had been ranged in a row; the adults received 10 cc. and the children 5 to 8 cc. according to their age and strength. Children tolerated these high doses well; the patients regarding whom it was necessary to be cautious were the aged and those who exhibited marked oedema or were cachectic. No special antiseptic precautions could be adopted but if a patient was suspected to suffer from syphilis or leprosy the needle was flamed before being used on the next case. Abscesses were very rare—only 1 in 500 cases—and the risk of conveying syphilis or other infection by the needle must be minimal as the solution of atoxyl would impede the development of the germs.

Amongst the Yakomas 3,844 cases of sleeping sickness were found in October 1912, 400 in January 1913, and 230 in March 1913, making a total of 4,474 patients. Of these 2,159 were treated once only, 1,475 received two injections and 840 three injections; in all 7,629 injections of atoxyl were made. In the first journey 42·06 per cent. of the inhabitants of Yakoma were found to be infected; in the two subsequent visits 630 new cases were discovered making a total of 49·06 per cent. Probably however the total population instead of being 9,000 was nearer 11,000, and thus the true percentage of infected cases was approximately forty.

A single visit extending from June 6th to September 25th was paid to the Zandés; 8,560 persons were examined and 1,751 (20·40 per cent.) found to be infected. Of these 228 were treated once, 328 received two injections of atoxyl, 620 three injections, 563 four injections and 17 five injections; in all 5,079 injections (comprising almost 5 kgm.) of atoxyl were given.

Amongst the native employees of commerce a considerable number (4–16 per cent. in different localities) of infected persons were found; these were all treated with atoxyl, receiving on an average four injections each. A number of cases were also discovered amongst the native troops and civil servants.

Only a single case was found amongst the Europeans. He had apparently become infected in 1909 and when seen by the author was in an advanced stage of the disease exhibiting ocular lesions—retinitis of the left eye and irido-choroiditis in the right. Between October 1912 and October 1913 he received 13 gm. of atoxyl in 13 doses of 1 gm. each. All the symptoms disappeared, the adenitis had almost entirely subsided and the ocular lesions had remained stationary.

With reference to atoxyl as a remedy for trypanosomiasis the author states that it should be given in sufficiently large doses (15 mgm. per kilo. of body weight). Such doses sterilise the peripheral circulation in some hours, smaller doses are insufficient. Man is the reservoir of the virus of sleeping sickness and as atoxyl sterilises the peripheral circulation it is an excellent prophylactic. Repeated injection of 15 mgm. per kilo. every 15 days or even every month for a year gives in the majority of cases a complete cure.

The author contrasts the value of the results obtained from medical men visiting the infected districts and there treating the patients, with those obtained from the establishment of central hospitals and treatment of patients at these institutions. He states that the only patients that benefit from the latter method are those who live in the vicinity of the hospitals; the others remain untreated either because they are too remote or because they do not desire treatment.

Other means of combating sleeping sickness are discussed, such as clearing the bush around the villages and on the banks of streams near the village, the removal of rubbish and of receptacles which can hold water wherein insects and mosquitoes can breed, and general hygienic measures which include the construction of suitable dwellings, the building of villages on desirable sites, the cultivation of crops and the prohibition of all usages which tend to degrade the individual and race such as alcoholism, slavery and cannibalism. Emphasis is laid on the damage done by alcohol and to a less degree by slavery.

In Yakoma, which is so decimated by sleeping sickness, *Glossina* is rarely encountered, but *G. palpalis* exists in the forests on certain tributaries of the Oubangui—the Koto, the Mbarague and the Nari. *Stomoxys* is not met with but there are on the contrary large numbers of tabanids and mosquitoes (*Culex* and *Mansonia*). *Anopheles* is rare and is represented by the genus *Myzomyia*. In the district of Rafai *G. palpalis* is found, but in Semongo where sleeping sickness is very marked only *G. morsitans*; *Culex* and *Mansonia* are not rare, and in the valley of the Haute Ali (Derbisaka) *Mansonia* are very abundant. At Zimas Chinko *anopheles* (*Myzomyia*) are found in numbers. The infected area of N'Zakara contains the same biting insects: *G. palpalis* on the M'Bari and its tributaries as far as its confluence with the Kobou, then *G. morsitans* on the Haut M'Bari. Other biting flies of the infected area are *Stomoxys*, *Tabanidae*, *Simulium*, *Ceratopogon*, *Haematopota* and a few *Chrysops*. The author considers that although *Glossina* is possibly responsible for the maintenance of the endemicity of the infection other insects, especially mosquitoes, are the cause of the epidemics.

*T. pecaui* appears to be the trypanosome most commonly found in domestic stock. Most of the infected animals became emaciated and died but occasional beasts remained in good condition.

W. Y.

LAVERAN (A.). Sur les variétés acentrosomiques artificielles des Trypanosomes.—*C. R. Acad. Sci.* 1915. Apr. 26. Vol. 160. No. 17. pp. 543-546.

The author briefly notes the work done previously in inducing a blepharoplastless condition in various trypanosomes by the use of oxazine. He has now studied the action of tryposafrol on various trypanosomes, and finds that they react to it in the same way as to oxazine.

Mice infected with *Trypanosoma brucei* were treated with 0.5 mg. to 1 mg. of the drug per mouse of 20 grams weight. After the 16th passage, the blepharoplasts had completely disappeared and this feature was retained after passage through untreated animals.

*Trypanosoma soudanense*, *T. gambiense* and *T. rhodesiense* gave incomplete results, the blepharoplasts disappearing from some of the



trypanosomes only. The non-pathogenic trypanosomes, *T. lewisi* and *T. duttoni*, are the most refractory. Blepharoplastless *T. evansi* has now undergone 450 passages (from 1911 up to April 17th, 1915) and the trypanosomes have remained without blepharoplasts. Passage through guinea-pigs, dogs and goats has not restored them. Similarly, blepharoplastless *T. brucei* has undergone 136 passages through mice, 111 through rats and 26 through guinea-pigs, making 273 passages in all, but the blepharoplasts have not reappeared.

Laveran states that biological as well as morphological tests are necessary to establish the identity of a trypanosome. He recalls the work of MESNIL and himself on cross-immunity, and applies the idea to immunity of hosts against normal trypanosomes and the corresponding blepharoplastless strains respectively. It is stated that the immunity which follows from an infection due to blepharoplastless *T. evansi* or *T. brucei* is only a little less complete than that following infections from either of the normal strains. *T. brucei* and *T. evansi* without blepharoplasts are a little less virulent than the corresponding normal forms. Laveran's experiments on goats and sheep showing the diminution in virulence of the blepharoplastless strains of these trypanosomes are given.

The results obtained indicate that if it is desired to inoculate surra or nagana to Capridae or Bovidae in order to produce immunity, use should be made of the blepharoplastless races of *T. evansi* and *T. brucei* respectively.

H. B. Fantham.

WOODCOCK (H. M.). On the Occurrence in Certain Cases of a Definite Transmissive Phase of a Trypanosome in the Vertebrate Host.—*Arch. f. Protistenkunde*. 1914. Nov. 3. Vol. 35. No. 2. pp. 197-198.

Referring to a paper by NÖLLER [see this *Bulletin*, Vol. 4, p. 269 and Vol. 5, p. 318], the author remarks that MINCHIN and himself showed clearly in 1911 that in *Trypanosoma noctuae* of the little owl "there is a characteristic and distinctive form which is the transmissive phase, passing into the mosquito and there initiating the other half of the life-cycle. This type is a small or medium sized, stout spindle, quite different from any of the other forms of the parasite; it is present, alone, in the peripheral circulation, during the early summer months." Woodcock found a similar phase in *T. fringillarum*, and ROBERTSON has found one in *T. gambiense* in vertebrates.

H. B. F.

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## TROPICAL DISEASES BUREAU.

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## PROTOZOOLOGY.

FANTHAM (H. B.). Insect Flagellates and the Evolution of Disease, with Remarks on the Importance of Comparative Methods in the Study of Protozoology.—*Ann. Trop. Med. & Parasit.* 1915. June 30. Vol. 9. No. 2. pp. 335-348.

The present paper deals with the great need for the use of comparative methods in the study of protozoology, especially as applied to disease, and for more attention to be paid to the biological evolution of disease producing agents. "For this study a knowledge of comparative morphology and of the inferences to be made therefrom is absolutely essential." The misapplication of energy in destructive, speculative and irrelevant criticism and controversy based, as it usually is, on incomplete knowledge on the part of the critics, is deplored. At the same time, "legitimate criticism is always welcome, but when it degenerates into mere retort and negation, it is subversive of progress." The lack of a broad comparative outlook on the part of many critics has resulted in sterility occurring, where fertility should have been assured, had the problems been attacked from a wider standpoint. The problems relating to human leishmaniasis serve as a striking illustration.

The author discusses fully the significance of the herpetomonad stage of *Leishmania*. It is shown how the discovery of the flagellate stage of *Leishmania donovani* in cultures by ROGERS, and of the root of the flagellum in *L. donovani* by CHRISTOPHERS, in *L. tropica* by MESNIL and colleagues and in *L. infantum* by NOVY, coupled with the knowledge of the life cycle of a herpetomonad given by PATTON, should have led early to experiments on the evolution of the diseases due to these parasites. It is also recalled that ROGERS, in 1905, gave a far-seeing warning that preventive measures should be instituted against probable insect carriers of leishmaniasis, even if absolute proof had not been obtained.

The existence of herpetomonad stages of *Leishmania* (especially of *L. tropica*) in man, as recorded by ESCOMEL, MONGE, LA CAVA and SPLENDORE is discussed, and also the occurrence of flagellate stages of *Histoplasma capsulatum* as described by DARLING, but overlooked or ignored by certain workers who desire to prove it a yeast. The herpetomonad parasite of man, *Haemocystozoon brasiliense*, also is noted. This collection of examples is sufficient to demonstrate the existence of flagellate herpetomonad parasites in man.

That herpetomonads occur naturally in other vertebrates is also shown. DUTTON and TODD's early finds of herpetomonads in mice in Senegambia, and those of the author and colleague in mice in England, suffice to prove this point. There is thus afforded evidence for the statement that "it is highly probable that the so-called herpetomonad stages of trypanosomes were really cultures of scanty herpetomonad infections coexisting with trypanosome infections."

A slight but necessary diversion is made to draw attention to the recent wrong use of the term *Leptomonas* for herpetomonads, and to the lack of precise knowledge of the so-called type species of this so-called genus.

Plants also suffer from "flagellosis" due to a flagellate parasite, *Herpetomonas (Leptomonas) davidi*, which occurs in them and in Hemiptera which infest them and which serve as the transmitters of the malady.

Experimental evidence that flagellates normally parasitic in insects can live, multiply within and become pathogenic to vertebrates, when fed or inoculated to them, is given. The work of LAVERAN and FRANCHINI in France and of FANTHAM and PORTER in England in this connection is cited in some detail. These experiments show plainly "leishmaniasis in the making," and point the way to preventive measures in connection with kala azar and allied diseases, the only practical attempts on these lines having been made by DODDS PRICE and ROGERS in Assam, with considerable success.

The author's summary is as follows :—

"The significance of the herpetomonad stage of *Leishmania*, of the recent announcements that such stages occur in man, and of the presence of natural herpetomonads in other vertebrates (for example, mice), are discussed. It also recalled that insect herpetomonads can invade and live in plant-tissues.

"The experiments on the introduction into different vertebrates of various species of *Herpetomonas* and *Crithidia* parasitic in insects by Laveran and Franchini, using mammals, and by Fantham and Porter, using both warm- and cold-blooded vertebrates, are summarised and discussed.

"It is inferred that the various leishmaniases are due to a herpetomonad of invertebrates which, under different conditions of environment, produces pathogenic effects in very varying degrees in different vertebrates, from zero, as in the mice described by Dutton and Todd in 1903, to high mortality as in Indian kala-azar, and probably zero again in cold-blooded hosts. It is also a flagellate which can probably live in invertebrates not already recorded as being infected. A human reservoir of leishmaniasis may occur in some places, while warm- and cold-blooded vertebrates may also function as the same.

"It is highly probable that the so-called cultural herpetomonad stages of trypanosomes were really cultures of scanty herpetomonad infections co-existing with trypanosome infections.

"It is recalled that Rogers in 1905 published that "it is worth while to discuss which are the most probable kinds [of insect transmitters of kala azar] in order that precautions may be taken against them without waiting for absolute proof to be obtained." Although these remarks were published ten years ago, little has been done directly in the way of the preventive measures suggested. A notable exception, however, is the work of Dodds Price in Assam."

W. Yorke.

FANTHAM (H. B.) & PORTER (Annie). Further Experimental Researches on Insect Flagellates introduced into Vertebrates.—*Proc. Cambridge Philosoph. Soc.* 1915. June 14. Vol. 18. Pt. 3. pp. 137–148.

The present paper contains an account of the continuation and extension of the work previously done by the authors in experimentally introducing into vertebrates flagellates belonging to the genera *Herpetomonas* and *Crithidia*, which live naturally in the digestive tracts of insects [see this *Bulletin*, Vol. 5, pp. 280–282.] Flagellates from sanguivorous and non-sanguivorous insects have now been used, and the vertebrate hosts now include representatives of most of the great groups.

“The flagellates used in this research include *Herpetomonas jaculum* (Léger) parasitic in the gut of the Hemipteran, *Nepa cinerea*; *H. stratiomyiae* (Fantham and Porter) from the digestive tract of the larva of the Dipteran, *Stratiomyia chameleon*; *H. pediculi* (Fantham) from the gut of the body-louse, *Pediculus vestimenti*; and *Crithidia gerridis* (Patton) from the alimentary tract of the Hemipteran, *Gerris paludum*. It will be seen that some of these insect hosts are blood-suckers, while others are not.

“The vertebrate hosts included sticklebacks (*Gasterosteus aculeatus*) among the Pisces; newts (*Molge vulgaris*), frogs (*Rana temporaria*) and toads (*Bufo vulgaris*) among the Amphibia; lizards (*Lacerta vivipara*) and a grass-snake (*Tropidonotus natrix*) among the Reptilia, and mice (*Mus musculus*) among the Mammals.

“The insect flagellates were introduced into the vertebrates by inoculation or by feeding. No ectoparasites and no haematozoa were present on or in the vertebrate hosts at the commencement of the researches.”

Full records are given of seventeen experiments on the introduction of the above-mentioned flagellates into 2 sticklebacks, 2 frogs, 2 toads, 1 newt, 3 lizards, 1 grass snake and 6 mice. “The work is necessarily prolonged and tedious, as some of the animals used live for months, and consequently relatively few experimental vertebrates can be managed and observed at any one time.” The introduced protozoa were pathogenic to the mammals but not markedly so to the cold-blooded vertebrates. *Herpetomonas jaculum*, *H. stratiomyiae*, *H. pediculi* and *Crithidia gerridis* proved pathogenic to mice. Frogs became infected with *H. jaculum* and *C. gerridis*, sticklebacks, toads and grass snakes with *H. jaculum* and lizards with *C. gerridis*. Second and third passages of some of the parasites were obtained. Thus, a mouse became infected by feeding on the liver of another that had died from infection with *H. pediculi* from human body lice. Similarly, a lizard died after infection with *Crithidia gerridis*. A second lizard fed on the liver of the first, also contracted the infection, and a third one, inoculated with the heart blood of the second, showed leishmaniform parasites. Thus, three passages of the parasite have been accomplished.

Control vertebrates were kept in each case. They remained healthy and unparasitised, and lived longer than the experimental animals.

The parasites, whether *Herpetomonas* or *Crithidia*, were present in the vertebrate hosts in either the non-flagellate or the flagellate form, or usually both. They were more abundant in the internal organs of the host, particularly in the liver, spleen and bone-marrow. “The appearance and relative position of the blepharoplast in leishmaniform elements vary. It may be either bacilliform or dot-like in shape, and thus resembles that of *Leishmania tropica* more than that often

seen in *L. donovani*, though variations occur in all these parasites, *L. tropica* thus seems to have retained more of the variation seen in the original insect flagellate stock from which it was derived." In all experiments where *C. gerridis* was used, the parasite invariably retained the crithidial facies in the vertebrate host. No transition to a trypanosome was ever seen. It is noted that "infections obtained in the adult experimental animals were not heavy, thereby differing from those recorded in young animals in our previous paper. . . . Doubtless, the parasites are more virulent in young hosts, as is the case with Mediterranean kala azar in children."

The authors draw attention to the occurrence of herpetomonad stages of *Leishmania* in man, and to the observations of SERGENT, LEMAIRE and SENEVET on the presence of a herpetomonad flagellate in cultures of the blood and organs of geckos obtained from areas in Algeria in which oriental sore, due to *L. tropica*, is prevalent. *Phlebotomus* flies, which may harbour a natural herpetomonas, feed on the geckos and man. Hence, animals like geckos may act as reservoirs of leishmaniasis. The account given by LINDSAY of the possible interrelations of ticks or flies and rattlesnakes with human dermomo-cosal leishmaniasis in Paraguay, is also noted. Mice may be reservoirs of herpetomoniasis in nature, herpetomonads having been observed by DUTTON and TODD in 1903 in Senegambian mice, and subsequently by the present authors in mice in England [see below]. The experiments detailed in the present paper show that insect flagellates belonging to the genera *Herpetomonas* and *Crithidia* have produced infections not only in mammalian hosts like mice, but also in cold-blooded vertebrates belonging to the Pisces, Amphibia and Reptilia. Hence, there is the possibility of any of these animals acting as reservoirs, under suitable conditions.

The authors' conclusions are as follows:—

"1. Herpetomoniasis can be induced in various warm- and cold-blooded vertebrates when the latter are inoculated or fed with herpetomonads occurring in the digestive tracts of various insects. The infection produced and the protozoal parasites found in the vertebrates resemble those of human and canine leishmaniasis.

"2. An infection can also be induced in certain vertebrates when they are fed or inoculated with *Crithidia gerridis*, and both flagellate and non-flagellate stages occur therein, but no transition to a trypanosome was found.

"3. The following Flagellata have proved pathogenic to warm-blooded mammals when the latter have been fed, or inoculated subcutaneously or intraperitoneally with them—*Herpetomonas jaculum*, *H. stratiomyiae*, *H. pediculi* and *Crithidia gerridis*. The hosts used were mice of various ages. That *H. ctenocephali* can infect dogs has already been shown by us.

"4. *Herpetomonas jaculum* and *Crithidia gerridis* have also been successfully fed or inoculated into cold-blooded hosts, namely, fishes (*Gasterosteus aculeatus*), frogs, toads, lizards (*Lacerta vivipara*) and grass-snakes (*Tropidonotus natrix*).

"5. As we have previously stated, we believe that leishmaniasis are arthropod-borne herpetomoniasis, and that these maladies have been evolved from flagellates of invertebrates (especially herpetomonads of insects), which have been able to adapt themselves to life in vertebrates.

"6. In areas where leishmaniasis are endemic, an examination should be made of all insects and other invertebrates likely to come into contact with men or dogs or rats and mice, in order to ascertain if these invertebrates harbour herpetomonads. Preventive measures should be directed against such invertebrates, especially arthropods. Further, it is likely

that certain vertebrates, such as reptiles and amphibia (especially those that are insectivorous), may serve as reservoirs for leishmaniasis or, as they should preferably be termed, herpeticomoniasis. From such reservoirs the herpeticomonads may reach man by the agency of ectoparasites or flies, especially such as are sanguivorous."

W. Y.

FANTHAM (H. B.) & PORTER (Annie). **On the Natural Occurrence of Herpeticomonads (Leptomonads) in Mice.**—*Parasitology*. 1915. June. Vol. 8. No. 1. pp. 128–132. With 7 text figs.

The authors recall their discovery in 1909, in Cambridge, of herpeticomonads in the blood of mice. The infection was scanty and the parasites were examined in the fresh state and stained *intra vitam*. The flagellates were also seen in 1911 and 1912, but again the infections were scanty.

The herpeticomonads measured  $11\mu$  to  $18\mu$  in length by  $3\mu$  to  $4\mu$  in maximum breadth, and were uniflagellate. The movements of the organisms are described. Partial formation of the non-flagellate, leishmaniform stage was sometimes seen in life. The mice were kept in laboratories where rats and rat-fleas, *Ceratophyllus fasciatus* and *Ctenophthalmus agyrtes*, were present. It is very likely that the former flea was infected with *Herpeticomonas pattoni*, as such fleas in England are known to harbour scanty infections of this flagellate.

The authors refer to their previous and other researches on the introduction of insect flagellates into vertebrates [see this *Bulletin*, Vol. v, pp. 280–282, and above.] They also refer at length to the interesting remarks of DUTTON and TODD\* (1903) on the natural infection of house mice with herpeticomonads at McCarthy Island, Gambia River.

The authors' conclusions are:—

"(1). That natural herpeticomonads (or leptomonads) occur in mice.

"(2). That the origin of the infection is to be sought in a flagellate of an ectoparasite of the mouse. This flagellate is very probably *Herpeticomonas pattoni*, a natural or specific parasite of fleas (especially rat fleas), which protozoön can adapt itself to life in the blood of mice.

"(3). Herpeticomonads have been recorded from rat fleas, dog fleas and human fleas. Probably the flagellates are varieties of one species, *H. pattoni*, which can live in the blood and certain internal organs of rats, mice, dogs and man."

The paper is illustrated by 7 text-figures.

W. Y.

FRANCHINI (G.) & MANTOVANI (M.). **Infection expérimentale du rat et de la souris par *Herpeticomonas muscae domesticae*.**—*Bull. Soc. Path. Exot.* 1915. Mar. Vol. 8. No. 3. pp. 109–111.

The authors have conducted successful experiments with *Herpeticomonas muscae domesticae* obtained from flies in Bologna and neighbourhood. The flies captured on farms were parasitised to the extent of 3 per cent., but those caught in houses were never infected. Various flagellate forms were seen, but non-flagellate stages were rare.

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\* See *Liverpool Sch. Trop. Med., Memoir xi*, pp. 56–57.

Six rats were inoculated intraperitoneally with the gut-contents of heavily infected flies. Three rats died of peritonitis, and the three remaining ones became infected with *Herpetomonas*. Protocols of the latter are given, and may be summarised thus:—

One rat lived 80 days, though it became thin. Non-flagellate parasites occurred in the spleen and bone-marrow. The second rat was killed 108 days after inoculation, while still in good health. Leishmaniform and uninucleate rounded parasites were seen in the spleen, bone-marrow, and liver. One flagellate form had been seen previously in a blood smear. The third rat was killed after 65 days, when ill. Elongate, leishmaniform parasites were seen in the spleen, bone-marrow and liver.

Other rats were inoculated intraperitoneally with the blood or emulsion of organs from infected rats, and themselves became infected. Protocols of five are given. All showed leishmaniform parasites.

Another rat was fed on a 12 days' old culture of *Herpetomonas muscae domesticae* containing various stages of the parasite. When the rat was killed two and a half months later, it showed a few leishmaniform elements in the liver, spleen and bone-marrow.

A culture on a Novy-glucose medium of the heart blood of one of the first infected rats showed, after 12 days, Anaplasma-like organisms. Two mice inoculated intraperitoneally therewith showed a few leishmaniform parasites in the liver at autopsy. Attempts at sub-cultures failed.

All the experimental animals were free from fleas, and contained no blood parasites, when examined at the commencement of the researches.

H. B. Fantham.

LAVERAN (A.) & FRANCHINI (G.). *Au sujet d'un Herpetomonas de Ctenopsylla musculi et de sa culture.*—*Bull. Soc. Path. Exot.* 1915. May. Vol. 8. No. 5. pp. 266-270.

The authors have succeeded in obtaining a pure culture of a new *Herpetomonas*, *H. ctenopsyllae*, parasitic in the digestive tract of the mouse flea, *Ctenopsylla musculi*. Fleas frequently contain few bacteria in their alimentary canals.

*Herpetomonas ctenopsyllae* in the mouse flea shows leishmaniform stages, the smallest of which measure  $2\mu$  to  $4\mu$  by  $1\mu$ . These elements are oval and non-flagellate, each usually containing a nucleus and a blepharoplast. They are often arranged in rosettes. There are also elongate non-flagellate forms, measuring  $5\mu$  to  $15\mu$  by  $1.5\mu$  to  $2\mu$ , with one end rounded and the other drawn out. Flagellate forms are rare with short flagella. Dividing parasites are common. Encysted stages were not seen in the flea faeces.

The *Herpetomonas* of the mouse flea is considered to be a new species because of the rarity of the flagellate forms and the shortness of the flagellum. [It is very doubtful whether these are valid criteria for founding a new species.]

For the purposes of culture, the fleas were killed with ether or xylol vapour. They were then washed a dozen times in sterile salt solution. The food canals were removed aseptically and placed in the liquid of condensation of simplified Novy medium. The cultures were kept

at 25° to 26° C. Six tubes of rabbit-blood-agar medium were so prepared. Of these, four became contaminated with fungi and bacteria, one remained sterile and one gave a pure culture of the *Herpetomonas*. This culture five days after sowing was negative, but on the ninth day showed a very few immobile rounded parasites and on the 14th day contained elongate parasites, often arranged in rosettes and exhibiting slow movements, but staining badly after fixation. Sub-cultures were made and in eight to ten days gave pure cultures of *H. ctenopsyllae*. Third and fourth passages were successfully obtained, and the preparations therefrom stained well. The blood-agar should be freshly prepared for use.

In cultures, non-flagellate elements,  $4\mu$  to  $6\mu$  by  $1\mu$ , were found either singly or in rosettes, and some were in process of division. There were also elongate parasites measuring  $7\mu$  to  $20\mu$  by  $2\mu$ . Some cultures contain spherical, non-flagellate forms about  $5\mu$  in diameter. Flagellate forms were relatively rare and measured up to  $20\mu$  by  $1\mu$ .

The authors propose to inoculate these cultural herpetomonads into mammals.

H. B. F.

BRUG (S. L.). *Herpetomonas homalomyiae*, n. sp.—*Arch. f. Protistenkunde*. 1914. Nov. 3. Vol. 35. No. 2. pp. 119–126. With 1 plate.

The author gives an account of *Herpetomonas homalomyiae*, parasitic in the alimentary tract of the larvae of *Homalomyia scalaris*. The observations were commenced in November 1913 and extended to 1914. Parasites were most abundant at the commencement of the winter and dwindled later. The larvae died before pupation. The herpetomonads were almost entirely limited to the main gut, and were rare in the Malpighian tubules.

The full grown flagellate has an elongate body. It is about  $26\mu$  by  $3\mu$ , the flagellum being as long as the body. The organism is uniflagellate. Biflagellate forms are in process of division. The flagellum arises from near the blepharoplast and a granule [basal granule] is at its origin. The nucleus is oval and is centrally situated, the blepharoplast is round or oval and the protoplasm is usually homogeneous.

The cysts or postflagellate forms are distinctive. They are  $3\mu$  to  $4.5\mu$  by  $5\mu$  to  $6.5\mu$ . Each usually contains a nucleus, blepharoplast and chromidia. At encystment, the body curves, the flagellum is withdrawn and bends round from the blepharoplast, forming a loop in the cytoplasm.

Multiplication is by longitudinal division. The author believes that the flagellum of the parent does not divide, but that one of the daughter organisms produces a new flagellum. Multiple division was seen once only, and division rosettes were never observed. The encysted forms showed no division.

The author reiterates PATTON's opinion that pre- and post-flagellate stages as well as the fully grown flagellate form must be taken into full consideration before giving specific rank to any flagellate. He also follows PATTON's diagnosis of the genus *Herpetomonas*.

The paper is illustrated by a plate of 40 figures.

H. B. F.



RODHAIN (J.). *Herpetomonas* parasites de larves d'Oestrides cavicoles. — *Bull. Soc. Path. Exot.* 1915. June. Vol. 8. No. 6. pp. 369–372. With 1 plate.

Herpetomonads were found in the digestive tubes of the larvae of cavicolous Oestridae living in the antelope, *Bubalis lehuell jacksoni*, from the plain of Ouellé, to the north of Doungou, Belgian Congo, and in *Potamochoerus porcus*, a river hog from the forest to the south of Ouellé, near Bambili.

(i). *Herpetomonas* from larvae living in *Bubalis*. The parasites, as seen in life, are large, lanceolate organisms each with a thick anterior flagellum. The length of the body is  $30\mu$  to  $45\mu$ , and the breadth is  $3.5\mu$  to  $6.25\mu$ . In stained preparations the body is seen to be slightly acuminate posteriorly, and its greatest breadth is a little anterior to the nucleus. The blepharoplast and nucleus are in the position usual to herpetomonads. The intracellular, basal portion (or rhizoplast) of the flagellum is thick and arises from a basal granule. The flagellum is surrounded by a thin, periplastic membrane. Rhizoplast and flagellum are always double, even when the parasite is at rest. The author considers that two axostyles occur in the cytoplasm in the form of thin, chromatophile filaments, extending from the rhizoplasts to the posterior end of the body, and crossing one another in front of and behind the nucleus. Cysts of the flagellate were not seen, but forms in process of encystment were found on the surface of the mucosa lining the frontal sinus of the host.

Five species of Oestridae were found in the frontal sinus of the *Bubalis*. They were *Oestrus aureo-argentatus*, *O. bertrandi*, *Gedoesia paradoxa*, *Kirkia* sp., and *K. minuta*. The larvae of all five Oestrids were found to be infected, but the adult flies were not parasitised.

(ii). *Herpetomonas* of larvae of *Rhinoestrus nivarleti* living in *Potamochoerus porcus*. Six larvae found on the same river hog were all infected with a herpetomonad allied to the preceding, but a little smaller with a little less distinct double flagellum. Forms in process of encystment were seen. The haemocoelic fluid of the larvae was not infected. Precocious division of the flagellar apparatus in the adult parasites gives rise to forms which are really bi-flagellate. The author assigns the flagellate of Oestridae provisionally to *Herpetomonas muscae domesticae*.

Subcutaneous inoculation of a young guinea-pig with the flagellate was negative.

H. B. F.

MACKINNON (DORIS L.). Studies on Parasitic Protozoa. III (a). Notes on the Flagellate *Embadomonas*. (b.) The Multiplication Cysts of a Trichomastigine.—*Quart. Jl. Microscop. Sci.* 1915. Vol. 61. Pt. 1. (New Ser. No. 241). pp. 105–118. With 1 plate.

The first part of this paper is occupied with a further description and emendation of the genus *Embadomonas*, created by the author in 1911 for a slipper-shaped flagellate found in the intestine of trichopterous larvae. Another species has since been found in the intestine of the crane fly. The new diagnosis of the genus *Embadomonas* is as follows:—

“This genus contains small slipper-shaped flagellates, characterised by

a very large cytostome bordered by prominent lips, which are more or less siderophilous, and two flagella, not so long as the body, one acting as an organ of locomotion, and the other lying in the cytostome; the spherical nucleus is placed at the anterior end of the body; the two basal granules, from which rise the flagella, lie at the anterior border of the cytostome. There is a definite periplast, which prevents deformation of the body. The anterior part of the body shows a well-marked torsion. The cysts are relatively small, and are ovoid in form."

"As 'species characters' may be used: (1) The form of the body; (2) the nature of the periplast; (3) the degree of development of the cytostome and its lips; (4) the size of the cysts."

A full diagnosis of *Embadomonas agilis* and of *E. alexeieffi* is then given. The author points out that in the original diagnosis of the genus *Embadomonas* it was described as uniflagellate.

A detailed account of the division of *Embadomonas alexeieffi* and some notes on the encystment of these flagellates follows, and the section closes with a discussion of the affinities of the genera of the Chilomastigines.

The second section of the paper contains an account of division phenomena in the cysts of a trichomastigine, either *Trichomastix trichopterorum* or *Tetratrichomastix parisii*, from tipulid larvae. The parasite forms almost spherical cysts of  $4\mu$  to  $5\mu$  diameter. "Within the cyst the flagella may persist as dark coiled lines lying superficially in the cytoplasm." Complicated changes occur in the nucleus and basal granules, consequent on which new axostyles are produced as well as new nuclei. Some of the parental flagella seem to persist, others are regrown. "There is no trace of any sexual process."

H. B. F.

SCHULTZ (C. H.). *Coccidiosis in Cattle and Carabaos.*—*Jl. Infect. Dis.* 1915. July. Vol. 17. No. 1. pp. 95-108.

The paper deals in a somewhat diffuse and discursive manner with coccidiosis in cattle and carabaos in the Philippine Islands, where rinderpest is common. The author's attention was attracted to the investigation of irregular or atypical cases of apparent rinderpest. Some of these animals were found to be suffering from acute or chronic coccidian gastro-enteritis. He thinks that some of the swampy pastures and water holes were contaminated. The faeces of infected animals were diarrhoeic or dysenteric. The animals suffering from coccidiosis lived longer than those infected with rinderpest, but gradually became weaker and lost flesh, exhibiting symptoms of dysentery and slow cachexia, but not acute toxæmia. Lesions typical of a severe gastro-intestinal disturbance, due to asexual multiplication of *Coccidia* in different parts of the intestine, were found. The author lays stress upon a fact, which should be already well known, that *Coccidia* "produce dangerous dysentery only during their asexual multiplication" when merozoites may be passed in the faeces.

Rinderpest and coccidiosis are often associated and difficult to separate clinically. The former was detected by a sero-diagnostic test of the urine, while the latter may be diagnosed by the microscope. A survey of the literature relating to coccidiosis in cattle is given but the causal agent is said to be *Stiedia eimeria*—a very inaccurate

rendering of *Eimeria stiedae*. An incomplete and somewhat misleading account of the life-cycle is outlined. It is thought that some stages of the life-cycle may be passed in the blood system. MONTGOMERY'S statements regarding the differentiation of rinderpest and coccidiosis are quoted, namely, that rinderpest can be transmitted by blood inoculation while coccidiosis cannot be so transmitted. Animals immune to rinderpest have been observed, in many cases, to be periodic carriers of *Coccidia*. It is concluded that coccidiosis has an extensive distribution throughout the Philippine Islands.

H. B. F.

STEVENSON (A. C.). *Klossiella muris*.—*Quart. Jl. Microscop. Sci.* 1915. Vol. 61. Pt. 1. (New Ser. No. 241). pp. 127–135. With 1 plate.

The author gives a brief resumé of the literature relating to *Klossiella muris* and then an account of the forms of the parasite as observed by him in the urinary system of white mice. Twenty-five white mice were examined and 40 per cent. were infected. What were possibly the youngest forms of *K. muris* observed were small, gregariniform bodies about  $12\mu$  long, but the nature of these is somewhat doubtful, as the author states that they may have been merozoites of the intestinal coccidium of the mouse. The next stage is found in the arterioles of the kidneys. The round parasite is endothelial, about  $8\mu$  in diameter and contains three nuclei in process of division. Two types of schizogony have been seen. The first occurred in one case only, wherein parasites containing 8 to 12 daughter forms, each with a well-marked karyosomatic nucleus, were found in an endothelial cell of the arteriole. The second form of schizogony usually took place in "cells forming the capillaries in the glomeruli of the kidneys." On five occasions in all, it has also been seen in the endothelial cells of the arterioles. Fifty to sixty daughter forms are produced. Each of these daughter organisms is gregariniform, and has "a nuclear area containing two small masses of chromatin and some residual protoplasm." These merozoites are liberated by the bursting of the host cell into the Bowman's capsule and pass into the cells of the convoluted portion of the tubule in "the condition of gametocytes or gametes" according to the author's belief.

The next stage is "somewhat difficult to interpret." The author considers that "the normal condition is a double infection of the cells, the two individuals being at first indistinguishable from one another." Single infections are also found. The author discusses the two types of syngamy that may occur, and concludes that whatever it may be, "there is no doubt that fusion or association of the two gametocytes takes place," and that this is followed by nuclear division until 12 to 16 peripherally arranged nuclei are present. "The nuclei gradually travel outside the line of general contour of the parasite and along with some of the cytoplasm are finally budded off one by one." The nuclei in these buds or sporoblasts then divide, enlargement occurs, a cyst wall forms around each sporoblast and a spherical body containing about 25 nuclei, each consisting of 3 grains of chromatin arranged in a line, is produced. Thus, "a spore cyst containing about twenty-five sporozoites with a certain amount of residual matter at one pole of the cyst" is formed. The capsule bursts, and the spores pass down the tubules, through the papillae and ureter to the bladder.

The concluding section of the paper consists of speculations as to a possible connection of *Klossiella muris* with the Leucocytozoozoon of the mouse, and whether *Klossiella* is a link between the haemogregarines and the coccidia. Both, as shown by the number of phases it is necessary "to presuppose" are very problematic.

The author considers that the possibility of *Klossiella muris* being a parasite of the arteries gives it a special interest from the medical point of view. A plate of 38 figures illustrates the paper.

H. B. F.

GONDER (Richard). *Zur Uebertragung von Haemoproteus columbae*.—*Arch. f. Protistenk.* 1915. Mar. 1. Vol. 35. No. 3. pp. 316-323.

The experiments detailed in this paper were made at the Veterinary Institute, Onderstepoort, Transvaal, South Africa, in 1910. The previous researches of the brothers SERGENT and ARAGÃO are discussed and confirmed. Like these workers, the author found "cysts" of *Haemoproteus columbae* in the lungs of pigeons and also discovered them in the liver.

The invertebrate host of the *Haemoproteus* in South Africa is the fly, *Lynchia olfersia capensis*. Gametes and ookinetes are formed in the digestive tract of the Hippoboscidae fly. The ookinetes get rid of their pigment and are then in a condition to be inoculated back into the pigeon. The parasites in the pigeon are taken up by the leucocytes, and find their way to the lung or liver. The infected leucocytes in these organs become greatly hypertrophied, as schizogony of the Haemosporidian takes place within them. The merozoites enter red blood corpuscles and become gametocytes in the peripheral blood of the bird.

By experiments, the author found the incubation period to be from 23 to 30 days. The development in the *Lynchia* was not found to progress beyond the ookinete stage, nor did the fly show hereditary infection. The infected flies lose their infectivity if fed on clean pigeons, but so long as ookinetes are present in the stomachs of the *Lynchia*, they are capable of transmitting the parasite. The *Lynchia* are not immune against reinfection.

Pigeons cannot be infected by direct blood inoculation. However, if blood is placed in a moist chamber and ookinetes allowed to form, then infection occurs if this cooled ookinete-containing blood is inoculated. Direct infection is also possible by the inoculation of parasitised lung emulsion.

H. B. F.

ADIE (Helen). *The Sporogony of Haemoproteus columbae*.—*Indian Jl. Med. Research.* 1915. Jan. Vol. 2. No. 3. pp. 671-680. With 3 plates.

The Haemosporidian parasite, *Haemoproteus (Halteridium) columbae*, is transmitted from pigeon to pigeon at Ambala, India, by the Hippoboscidae fly, *Lynchia maura*. The author's researches were conducted at Kasauli from mid-June to the end of September 1914, and the flies were brought from Ambala. There is a "succession of events" in the *Lynchia* including "the ookinete, the zygote, the bursting oöcyst

setting free sporozoites, and vast numbers of sporozoites in the salivary glands." There was no evidence of regurgitation of parasites. An account is given of the alimentary tract of the *Lynchia*.

Oökinetes are found "a few hours after the fly has fed on a pigeon with flagellating parasites." Zygotes are often seen in the lower portion of the mid-gut not far from the Malpighian tubes. They vary in size, according to growth, from  $7.2\mu$  by  $8.2\mu$  up to oöcysts  $36.5\mu$  by  $36.4\mu$ . The pigment in them consists of roundish (not rod-shaped) particles. "The zygotes resemble those of *Proteosoma* and malaria, but they seem to be smaller." The sporozoites measure from  $7\mu$  to  $10\mu$  in length.

Details are given of infection and transmission experiments.

The conclusions are as follows:—

"1. Pigeons at the places and the times indicated are very heavily infected with *Haemoproteus*; no other blood parasites were found.

"2. *Lynchia* flies associated with these pigeons are also very heavily infected with the sexual stages of a parasite analogous to *Proteosoma* and *Malaria*. Where flies are rare, pigeon infection is also rare. Kasauli pigeons show no flies and are, as far as my experience goes, free from infection.

"3. The development of *Haemoproteus* can be traced in the fly; the oökinete, zygote, oöcyst, and sporozoite stages have all been demonstrated. Sporozoites have been seen in vast numbers in the salivary glands and streaming down the salivary duct.

"4. Both sexes of *Lynchia* carry the infection.

"5. Laboratory bred flies placed on infected birds have shown in due course both zygotes and sporozoites of the same type as those of naturally infected flies.

"6. Kasauli pigeons for good reasons thought to be uninfected (but not laboratory hatched) have become infected by flies taken off heavily infected Ambala birds (flies afterwards dissected and found infected).

"7. The sporogony of *Haemoproteus* in this *Lynchia* is similar to that of *Proteosoma* and the malaria parasite. It is another instance of the cycle of Ross."

A "Mallophagus" was found on the *Lynchia* which fed on the latter, and apparently nourished itself on pigeon's blood taken from *Lynchia*.

[It is to be regretted that the author gives no drawings of the stages of the Protozoön in the *Lynchia*. Only the oökinete stage was formerly known therein. The illustrations accompanying the paper are entomological and are very diagrammatic.]

H. B. F.

CARPANO (Matteo). *Sul Ciclo Evolutivo dell'Haemoproteus Danilewskyi, Note Morfologiche e Biologiche del Parassita riscontrato in alcune Specie di Uccelli della Colonia Eritrea.*—[Cycle of Development of *H. danilewskyi*, Morphological and Biological Notes of the Parasite met with in Birds of Eritrea.] *Studi di Med. Trop.* 1914. Vol. 1. pp. 129–148. With 7 text figs. and 2 coloured plates.

The author, working in the Italian colony of Eritrea on the Red Sea, examined 327 birds during a period of about four years. The birds found to be parasitised with *Haemoproteus danilewskyi* were magpies, desert partridges, *Serpentarii* and owls. The infected birds appeared normal, though at post-mortem their spleens were found to be enlarged,

pigmented and pulpy, with dilated blood-vessels. The liver and bone-marrow were also pigmented. There was a slight rise of temperature (about 1° C.) every seven to eight days.

The schizogony and gametogony of the Haemosporidian are described and figured in detail. Regarding schizogony, the author's results confirm those of CELLI and SANFELICE (1891) and LABBÉ (1894). Two types of *Haemoproteus danilewskyi* were found, namely, type A in the owl and *Serpentarius* and type B in the magpie and desert partridge. The schizonts of type A are larger, more regular and more active than those of type B. Merozoite formation in type A is nearly always bipolar and regular, with the production of numerous (25 to 50) daughter forms. In type B unipolar formation of merozoites is more common and 15 to 25 are produced. The pigment in type A is fine and greenish in colour, while in type B it is rather coarser and brownish-yellow. The effect of the parasites on the erythrocytes in type B is rather more marked than in type A, with production of stippling resembling Schüffner's dots but staining blue with Romanowsky solution.

The author describes new gametocytic forms which he calls schizontigametes. They are stated to be somewhat different morphologically from ordinary gametes but to have the same function. The difference is said to be best seen in the microgametocytes (male schizontigametes) in that they retain the chromatinic granulation of the original schizonts.

The chief points in the author's conclusions may be rendered thus :—

(1). The magpie (*Coracias abyssinicus*), the desert partridge (*Caccabis petrosa*), the *Serpentarius* (*Gypogeranus serpentarius*), the owl (*Bubo lacteus*), birds inhabiting the colony of Eritrea, were found to be infected with *Haemoproteus danilewskyi*.

(2). The infection, as determined by alterations seen in the red blood cells and in the internal organs, produces no especial clinical symptoms, though the parasite is allied to that of human malaria.

(3). The *Haemoproteus* is found in all parts of the colony and at altitudes up to 2,500 metres. It is more abundant in basal regions up to 1,500 metres, where protozoal infections of men and animals are more common.

(4). The parasite is transmitted by species of *Culex*, namely, *C. pipiens*, *C. annulatus* and *C. fatigans*.

(5). The *Haemoproteus* lives within the red blood cells of the avian host and produces haemozoin, but the host cells are not markedly altered, though some of them show stippling comparable with Schüffner's dots.

(6). In the peripheral blood of the host there occur young forms, schizonts and merozoites, as well as sexual forms or gametocytes (♂ and ♀). When endoglobular, the latter are at first reniform and then become round. In some preparations schizonts predominate.

(7). Schizogony usually occurs at the two poles of the parasite, rarely at one only.

(8). Schaudinn's account of the schizogony of the *Haemoproteus* in *Athene noctua* is not confirmed.

(9). In blood kept in a moist chamber it was possible to observe the initial phases of sporogony, as well as the liberation of merozoites from host cells. Also, schizogonic forms in process of transformation to gametocytes (macrogametes and microgametocytes being formed

from merozoites), and schizontigametes were seen. Gametes were found to preponderate.

(10). The schizontigametes, seen by the author for the first time, differ slightly in morphology from ordinary gametes but behave as such. They are apparently destined for the conservation of the species.

(11). *Haemoproteus danilewskyi* was found in different birds. The author distinguishes two types of the parasite.

(12). Transmission by blood-inoculation from bird to bird of the same or different species has so far been unsuccessful.

H. B. F.

WENYON (C. M.). **The Pigmented Parasites of Cold-Blooded Animals, with some Notes on a Plasmodium of the Trinidad Iguana.**—*Jl. Trop. Med. & Hyg.* 1915. June 15. Vol. 18. No. 12. pp. 133-140. With 1 plate.

The author commences with a historical survey of the pigmented parasites of cold-blooded vertebrates. These protozoa were first seen by SIMOND in 1901, who found melanin-containing organisms in the red blood corpuscles in the Indian river tortoise, *Trionyx indicus*. SIMOND called the parasite *Haemamoeba metchnikowi*.

These pigmented parasites may be placed in two main genera: "Firstly, the genus *Plasmodium*, which includes parasites which go through the schizogony stage in the red blood corpuscles and produce gametocytes in these cells too; secondly, the genus *Haemoproteus*, including parasites which do not reproduce by schizogony in the red blood corpuscles, which cells only contain the gametocytes in varying stages of growth."

"A great difficulty of this classification is the fact that in certain instances of evident infection with a parasite of the genus *Plasmodium*, gametocytes alone may be present in the peripheral blood for considerable periods." The parasites of cold-blooded vertebrates, more especially of reptiles, agree in these respects with those of birds.

A detailed and illustrated account is given of a blood parasite of the Trinidad iguana, *I. sapidissima*. The youngest stages of the parasite are minute and are often situated at one pole of the erythrocyte. They increase in size, are irregular in shape, and form a few grains of brown pigment. During schizogony four merozoites are produced and these may be arranged crosswise, in the form of a semicircle, in the shape of a fan or in a cone-like manner. Gametocytes also were seen. Pigmented leucocytes occurred. The author considers that the parasite of the iguana must be included with that of the Brazilian lizard, *Mabuia agilis* in one species under the name, *Plasmodium minasense* (Carini and Rudolph, 1912).

The author considers that "two observations are exceedingly important in giving descriptions of these parasites." The first is that slight variations in staining reaction are of little value. The second is that the degree of alteration of the host erythrocyte depends largely on the interval of time elapsing between the death of the animal and the making of the blood films.

Brief descriptions are then given of the pigment-containing *Haemosporidia* occurring in lizards, chelonians and snakes. The parasites of lizards include *Plasmodium simondi* Castellani and Willey, 1904,

from *Hemidactylus leschenaulti*; *Plasmodium agamae* Wenyon, 1908, from *Agama colonorum*; *Plasmodium mabuiae* Wenyon, 1908, from *Mabuia quinquitaeniata*; *Plasmodium tropiduri* Aragão and Neiva, 1909, from *Tropidurus torquatus*; *Plasmodium diploglossi* Aragão and Neiva, 1909, from the *Diploglossus fasciatus*; *Plasmodium minasense* Carini and Rudolphi, 1912, from *Mabuia agilis* and *Iguana sapidissima*.

The parasites of Cheloniidae include *Haemoproteus metchnikowi* Simond, 1901, from *Trionyx indicus*; *Haemoproteus cajali* Pittaluga, 1912, from *Clemmys africana*; *Haemoproteus roumei* Bouet, 1909, from *Cinixys belliana*; *Haemoproteus testudinis* Laveran, 1905, from *Testudo pardalis*; *Haemoproteus chelonidae* Johnston and Cleland, 1909, from *Chelodina longicollis*; *C. oblonga* and *Emydura krefftii*: *Haemoproteus* sp., Plimmer, 1912, from various Cheloniidae which had died in the Zoological Society's Gardens in London.

The parasites of snakes apparently belong to one species, *Haemoproteus mesnili* Bouet, 1909, from various species of *Naja* and *Sepedon*.

H. B. F.

FRANÇA (C.). Quelques observations sur le genre *Leucocytozoon*.—*Bull. Soc. Path. Exot.* 1915. Apr. Vol. 8. No. 4. pp. 229-241.

The paper is divided into three sections, dealing respectively with the nature of the host cells, schizogony and the generic characters of *Leucocytozoon*.

The author notes the two different shapes of host cells already recorded for these parasites of avian blood, namely, those with fusiform prolongations and those which are rounded and without such prolongations. He briefly summarises [sometimes insufficiently for exactness] the views of previous workers on the nature of the host cell. These opinions incline to one or more of the following types of cell, erythroblast, mononuclear leucocyte and erythrocyte. He has studied *L. mathisi*, parasite of *Accipiter nisus* and *L. mirandae*, parasite of *Merula merula*. The former produces horn-like deformation of its host cells, the latter has no such effect. Very young birds were studied; they are stated to have been free from other haemocytozoan infections.

The two *Leucocytozoa* under investigation are said to be parasites of erythrocytes, whose action on the red blood cells is very rapid and very intense.

The young leucocytozoon of *Merula merula*, as it enters the host cell, is rod-like, recalling certain forms of *Theileria*, its length being  $1\mu$ . The parasite becomes pyriform, with its nucleus at the broader end and measures  $1.5\mu$  to  $2.2\mu$ . The host cell now appears to be poor in haemoglobin. The leucocytozoon then becomes rounded and its nucleus central, the body diameter being  $2.8\mu$  to  $3\mu$ . The host cells are now so altered that it is difficult to recognise them. The haemoglobin has almost disappeared and the nuclei of the erythrocytes are hypertrophied. The parasite is now rounded, and the host erythrocyte has lost its characters, its nucleus acting as an envelope to the parasite.

*L. mathisi* has similarly been shown to be a parasite of the red cells of its host.



The rounded form of host cell is considered to be due to two factors, the round shape of the gametocytes of the parasite, and precocious vacuolisation of the cytoplasm of the red cell invaded. The elongate and drawn out type of host cell is discussed and the movements and behaviour of the parasite within it is somewhat vaguely noted. It is concluded that it is the form of the parasite which determines that of the host cell.

Regarding schizogony, the work of FANTHAM, who first found schizogony in avian Leucocytozoa, MOLDOVAN, COLES and the author is reviewed. This phase takes place in the internal organs of the host, such as the spleen and the lungs.

The name Leucocytozoon was first used by DANILEWSKY in 1889, but it was ZIEMANN in 1898 who first established the genus. The parasites belonging thereto exhibit sexual dimorphism, and only gametocytes occur in the peripheral blood. They do not form pigment except *L. majoris*, which does so in some cases. The genus Leucocytozoon belongs to the family Haemamoebidae of the order Haemosporidia.

In a discussion, LAVERAN prefers the name Haemamoeba to Leucocytozoon. He considers that the type species is *L. ziemanni* (Laveran) and not *L. danilewskyi* (Ziemann).

[Regarding the author's remark that the form of the parasite determines the shape of the host cell, he appears to have overlooked the work of FANTHAM (1910) on this subject, who wrote :—"Personally, I have seen the spindle or horn-like ends of the host cell of *L. lovati* elongate during the movements of the parasite within it. . . . This (spindle shape) is probably due to a deformity of the cells brought about by the movements of the parasite within. . . . The shape of the host-cell of different Leucocytozoa may be merely a reflex of the motility of the parasite within." The movements of avian Leucocytozoa are described in detail in FANTHAM's memoir. (*Proc. Zool. Soc., Lond.*, 1910, p. 694). With regard to the systematic position of the Leucocytozoa, FANTHAM (1910), when describing the full schizogony of *L. lovati*, commented on the systematic position of the parasites as follows :—"The avian Leucocytozoa are typical members of the Haemosporidia, allied to the malarial parasites." (*Annals Trop. Med. & Parasitol.*, Vol. 4, p. 258).]

H. B. F.

WICKWARE (A. B.). Is *Leucocytozoon anatis* the Cause of a New Disease in Ducks?—*Parasitology*. 1915. June. Vol. 8. No. 1 pp. 17-21. With 3 plates.

Numerous outbreaks of disease among ducks having occurred in the district around Ottawa, the author investigated an outbreak at a poultry farm, where heavy mortality had prevailed. The ducks had been dying at the rate of 20 per day for a few days, then there "appeared to be a remission for about a ten day period" with a recurrence at the end of this when "fatalities would again be enormous."

The malady often ran a rapid and fatal course. The prodromal symptoms were very slight, lack of appetite being the most noticeable. Some died in the first attack, others after several exacerbations.

The birds lie in a semi-comatose condition but, if aroused, undergo remarkable contortions of the head and body. Their power of controlling equilibrium is lost, so that they fall about. In the majority of recovered birds, there is difficulty of locomotion, and the ducks are stunted and undersized. The mortality is 65 to 70 per cent.

Fly larvae were at first thought to be the cause, but they were found in a few sub-acute cases only. Microscopical examination of cerebro-spinal fluid, peritoneal exudate, etc. showed nothing. Cultures were not possible under the conditions of work. However, Leucocytozoa (*L. anatis*) were found in large numbers in ducks in which the infection ran an acute and fatal course. Smears of the spleen also showed an abundance of parasites. The predominant type of Leucocytozoon was spindle-shaped,  $35\mu$  to  $60\mu$  by  $10\mu$ . It possessed an oval, elongate or irregularly shaped nucleus, with a dark, chromatic band extending along one edge.

Transmission experiments by intraperitoneal inoculation of clean ducks, three weeks' old, were performed. On the seventh day, two "gamete forms" were noted in one of the ducks. Three days later, typical gamete forms appeared. They persisted a few days, and then disappeared.

In conclusion, the author states: "That the Leucocytozoön above described is the causative agent of this disease, we are not prepared to say." He gives reasons for it probably being the excitant, and for the failure to transmit the parasite. Two coloured plates of the parasite and one of photographs of the diseased ducks, illustrate the paper.

H. B. F.

KNUTH (P.). Ueber Piroplasmen bei europäischen Rindern mit besonderer Berücksichtigung ihrer Aetiologie. [Piroplasmosis in European Cattle and its Aetiology].—*Arch. f. Schiff- u. Trop.-Hyg.* 1915. May. Vol. 19. No. 9. pp. 245-267.

This paper is a review, containing an account, largely historical, geographical and etiological, of European piroplasmosis in cattle. The author describes *Piroplasma bigeminum* and *P. divergens*. He mentions the ticks responsible for the spread of piroplasmosis and the names of other ticks occurring in the regions where piroplasmosis is known. The part played by *Ixodes ricinus* in the spread of *P. bigeminum* is discussed. The author considers that *Haemaphysalis punctata* seu *cinnabarina* is responsible, together with *Ixodes ricinus*, for the transmission of *P. divergens*, which is the piroplasm found in some cattle in Great Britain as well as in others on parts of the Continent bordering on the North Sea. *P. divergens* is not very virulent.

The anatomical and pathological changes occurring in piroplasmoses in European cattle are discussed. Details regarding the association of a number of cases of splenic rupture with piroplasmosis are given. In such cases Anaplasma-like bodies were not found, although search was made for them. That few cattle die from European piroplasmosis is considered to be probably due to relatively few ticks being infected, while there is the possibility of young cattle acquiring immunity.

In conclusion, the author gives a short account of measures for combating European piroplasmosis in cattle. Protective blood inoculation of stock on the one hand, and tick destruction on the other, are recommended.

[A well illustrated account of piroplasmosis, considered from a much wider point of view, will be found in *Parasitology* (1913), Vol. 6, pp. 302-320. This account, more easily accessible to British workers, forms one of the Herter Lectures given by Professor NUTTALL.

H. B. F.

CARINI (A.) & MACIEL (J.). *Sobre a molestia dos Cães, chamada Nambi-Uvú e o seu Parasita (Rangelia vitalii)*. [On a disease of Dogs called Nambi-Uvú and its Parasite].—*Annaes Paulistas de Medicina e Cirurgia*. 1914. Sept. Vol. 3. No. 3. pp. 65-71. With 9 text figures.

There occurs in Brazil a disease of dogs (especially among hunting dogs) called nambi-uvú, which means bleeding from the ears. It is also known as "yellow fever of dogs," being marked by malignant jaundice or icterus. It was recorded by CARINI in 1908 and carefully described by BRUNO RANGEL PESTANA in 1910. The latter investigator ascribed the disease to a piroplasm, which he named *P. vitalii*. The disease may occur at any time during the year, but more frequently in the summer, especially among dogs after a hunt.

Three forms of the disease may be distinguished:—

1. Acute or icteric, with intermittent fever and temperatures up to 38°·5 to 40° C, and usually fatal.
2. Sub-acute or haemorrhagic, characterised especially by cutaneous capillary haemorrhages on the ears or back.
3. Chronic, with progressive wasting but no characteristic symptoms, usually ending in recovery.

The disease is experimentally transmissible by blood inoculation, and young dogs are more susceptible than adults. The latter, when successfully inoculated, usually exhibit the chronic form of the disease. The incubation period varies, being about 3 days, 8 to 15 days, and 18 to 25 days respectively in the three forms of the disease. In nature the sub-acute form is most frequently observed, but is not so common among experimentally infected animals. Regarding diagnosis, it should be noted that in the chronic form the parasite may not be found in the peripheral blood. Bile pigment may occur in the urine, but there is no characteristic lesion. The pathological anatomy and histology are described.

Regarding the causal agent of the disease the authors state that it differs from *Babesia canis* in multiplying by schizogony, as well as by binary fission. The unpigmented parasites occur in the red blood corpuscles. Young forms measure  $2\mu$ , older ones  $3\cdot5\mu$  to  $4\cdot5\mu$ , and may be round, oval or pyriform with alveolar cytoplasm and round, compact, excentric nucleus. There is no blepharoplast. Two parasites may be found in a red corpuscle, but three, four or more may occur. Free parasites are observed in the internal organs, and schizogony occurs therein. No flagellate forms were seen.

The authors give some details of the schizogonic stages, which they regard as separating the parasite from true piroplasms. In schizogony thirty to fifty or even a hundred or more parasites may be observed in interstitial cells of tissues or in the endothelial cells of capillaries of the inner organs. Masses of merozoites may be  $18\mu$  to  $25\mu$  across and are seen in the kidneys, heart and lungs. The parasite is placed in a new genus *Rangelia*, in the Piroplasmidae.

NUTTALL, who examined some of the preparations, called the authors' attention to resemblances between the parasite and *Rossiella rossi* of jackals. Attempts at culture were unsuccessful. The parasite may be transmitted by ticks. *Amblyomma cayennense* and *A. striatum* were found on some of the infected dogs. Parasites may still be found in dogs which have recovered and so a reservoir is maintained.

Trypanblue has been of service therapeutically in some cases. It was injected intravenously in 1 to 2 per cent. solution, in repeated doses of 10 to 20 cc.

The authors conclude that there exists in Brazil a grave, infectious disease of dogs, popularly known as nambi-uvú, characterised by jaundice and cutaneous and internal haemorrhages, caused by a parasite, *Rangelia vitalii*, belonging to the Piroplasmidae.

The paper is illustrated by 9 text-figures of the parasite.

H. B. F.

PRIESTLEY (Henry). *Theileria tachyglossi* (N. sp.). A Blood Parasite of *Tachyglossus aculeatus*.—*Ann. Trop. Med. & Parasit.* 1915. June 30. Vol. 9. No. 2. pp. 233–238. With 1 plate.

The author gives an account of a new *Theileria*, *T. tachyglossi*, found in the blood corpuscles of an Echidna, *Tachyglossus aculeatus*, from the neighbourhood of Townsville, Queensland. "In their morphological appearance the parasites resembled closely *Theileria parva* of East Coast Fever." Bacilliform, ovoid, pyriform, round and comma-shaped parasites were seen, as well as transitional forms. The bacilliform parasites measured  $1.8\mu$  to  $3.0\mu$  by  $0.3\mu$  to  $0.8\mu$ . The comma forms were  $2\mu$  to  $3\mu$  long, and  $0.8\mu$  to  $1.2\mu$  broad. The ovoid and pyriform ones were  $1\mu$  to  $3\mu$  by  $0.5\mu$  to  $1.2\mu$ , and no sharp line of distinction could be made between these two types. Rounded forms were the least common. They measured  $1.0\mu$  to  $2.2\mu$  in diameter. Koch's bodies occurred in small numbers in the peripheral blood and in large numbers in organ smears, particularly in the liver, spleen and lungs. They were either free or included in leucocytes or endothelial cells; they probably represent stages of asexual multiplication of the parasite. A coloured plate of 16 figures illustrates the paper.

H. B. F.

DIAS (Ezequiel Caetano) & ARAGÃO (Henrique de Beaurepaire). *Pesquisas sobre a Natureza dos Anaplasmas*. (On the Nature of Anaplasmata.) [Also in German].—*Mem. Inst. Oswaldo Cruz.* 1914. Vol. 6. No. 3. pp. 231–249. With 2 plates.

The first part of this memoir is devoted to a historical survey of the bodies which are termed Anaplasma. Certain authors consider that

*Anaplasma* is organismal and associate it with such diseases as "gall-sickness," while others have produced similar structures in the blood by the use of various reagents. The bodies, sometimes known as marginal points, are coccus-like and measure  $0.1\mu$  to  $0.5\mu$  in diameter.

The authors conducted a number of experiments on animals such as guinea-pigs, rabbits, dogs and cattle by inoculating them with phenylhydrazine, nitrobenzol, pyrogallie acid, saponin, phosphorus in oil emulsion and trypanblue. Saponin and phosphorus oil emulsion gave no interesting results, even when administered by the mouth. The authors produced *Anaplasma*-like bodies in rabbits, guinea-pigs, dogs and rats in 48 hours by inoculating haemolytic substances. Degenerative appearances of the red cells such as basophilia, polychromatophilia, anisocytosis, nucleated red cells, poikilocytosis, etc. were seen together with bodies having the characters applied by THEILER to *Anaplasma*. They compared the structures thus produced with preparations of natural *Anaplasma* obtained from THEILER and others. The staining reactions, size, morphology, lack of structure and pseudo-division forms were the same in bovines naturally infected with anaplasmosis as in those animals in which anaemia had been artificially induced.

Rabbits, guinea-pigs and dogs were the most suitable animals for these experiments, and the most useful reagents were nitrobenzol, pyrogallie acid and phenylhydrazine. Pyrogallie acid was administered in doses of 0.1 cc. per kilogram weight of the animal, the other two drugs were administered in various doses from 0.01 cc. to 0.1 cc. Care must be taken to regulate the dose according to the powers of resistance of the animal. *Anaplasma* have been found in the blood of animals infected with worms and in those newly born. Their presence in worm-infected animals is due to the haemolytic action of the helminthic toxins, and in very young animals to the activity of the haematopoietic organs.

The anaplasmosis of Brazil is considered to be really a piroplasmosis, in which the protozoan parasites remain chiefly in the internal organs of the host. It is concluded that *Anaplasma* are not parasitic organisms, as has also been stated previously by others. The haemolytic action of trypanblue injected intravenously has been found to result in the earlier appearance of *Anaplasma* in the blood. It has been stated that *Anaplasma* has a long incubation period up to 24 days in nature.

In their conclusions the authors emphasise that *Anaplasma* is not a Protozoon, but is a product of the degeneration of the red cells. It results from certain anaemic conditions produced by various haemolytic toxins. Anaplasmosis is not a true disease, the cases so described being a clinical form of piroplasmosis.

Protocols of the experiments are appended. The two plates illustrate natural and experimentally induced *Anaplasma*.

H. B. F.

VEGLIA (Francesco). *Cultura dell' Anaplasma Marginale in vitro. Nota preliminare.*—*Giorn. R. Accad. Med. di Torino*. 1915. Jan.-Feb. Vol. 78. No. 1-2. pp. 33-39.

The paper contains the early results of the author's researches on the culture of *Anaplasma marginale*, performed in Pretoria in the

laboratory of THEILER. The culture media tried were defibrinated blood of an infected animal, sodium chloride, sodium chloride and sodium citrate (according to the formula of CARPANO for the culture of *Nuttallia equi*), and ordinary broth. Defibrinated blood and Carpano's medium were most successful.

The following results were obtained with Carpano's medium :—A culture of the first series in three days showed an increase in infected blood corpuscles from 8 per cent. to 25 per cent. A culture of the third series in 20 days showed an increase in infected corpuscles from 7 per cent. to 20 per cent. and in 40 days to 25 per cent. A culture of the fourth series with an average of 17 per cent. of infected corpuscles gradually rose in 21 days to 30 per cent. A culture of the fifth series commencing with an infection of 1 to 2 per cent. of the blood corpuscles oscillated between 4 and 8 per cent. for three weeks and then rose rapidly to 20 per cent. in the next three days. A culture of the sixth series, which was from a weak strain, showed in 15 days a rise in infected corpuscles from 0·5 per cent. to 5 per cent. In a culture of the tenth series, the infection rose from 6 per cent. to 20 per cent. of the corpuscles in 8 days.

The results with a medium of defibrinated blood were :—A culture of the third series showed an increase in infected corpuscles from 16 per cent. to 24 per cent. in 4 days. A culture of the tenth series showed a percentage increase from 6 to 15 in the course of 8 days. After 5 days, a culture of the twelfth series showed an increase in the infected corpuscles from 3 to 11 per cent.

Cultures were incubated at 7° C., 15° C. and 25° C., though the author states that such differences of temperature do not exercise any marked effect on the increase in numbers of the parasite.

The addition of infected defibrinated blood to the defibrinated blood of an imported bovine recently immunised against anaplasmosis was unfavourable to the development of the culture of *Anaplasma*. Control cultures, made from the blood of normal cows and sheep were observed.

Regarding morphology, the author states that at the lower temperatures the predominating form was round. Later, these parasites became larger, somewhat irregular and elongate, with a triangular or quadrangular shape. The author thinks that the schizogonic cycle lasts 3 to 4 days. The triangular and quadrangular forms give rise to 3 and 4 merozoites respectively. Diplococcoid forms are also known, and large schizonts dividing into eight have also been found. Bacterial infection of the cultures was in some cases a serious obstacle. A mixed infection of *Anaplasma* and *Babesia bigemina* in culture showed an increase in the number of *Anaplasma* but the *Babesia* gradually died out.

The principal points in the author's conclusions are :—*Anaplasma* grows and reproduces in artificial media. Defibrinated blood and Carpano's medium (sodium chloride and sodium citrate) have proved the most successful. Basophile granulations and Jolly's corpuscles behave in a very different way from *Anaplasma* in these media; they do not increase in number but exhibit degenerative characters. In cultures of *Anaplasma* or of mixtures of *Anaplasma* and *Babesia* no transitional forms between the two organisms were seen. The blood of normal animals mixed with infected blood provides a good culture

medium, but the blood of an animal recently cured of anaplasmosis, mixed with infected blood, appears to inhibit the development of *Anaplasma*. It seems possible to cultivate *Anaplasma* taken from an infected animal during the incubation period. The progress of *Anaplasma* in culture is along the same general lines as in an infected animal.

H. B. F.

SANGIORGI (Giuseppe). *Toxoplasma ratti*, n. sp.—*Giorn. R. Accad. Med. di Torino*. 1914. Nov.-Dec. Vol. 77. No. 11-12. pp. 383-385.

The author gives a brief statement of the various *Toxoplasmata* already recorded, and adds to the list a new species, *Toxoplasma ratti*. He found this parasite in a lung smear of a white rat, *Mus rattus albinus*. Many of the elements observed were crescentic and all were uninucleate, measuring  $6.4\mu$  by  $2.4\mu$ . Division forms were not observed. Cardiac blood and bone-marrow were negative.

H. B. F.

BRUG (S. L.). *Octospora monospora* (Chatton u. Krempf).—*Arch. f. Protistenkunde*. 1914. Nov. 3. Vol. 35. No. 2. pp. 127-138. With 2 plates and 2 figs.

The author examined a number of the larvae of *Homalomyia scalaris* in November 1913, all being infected with *Octospora monospora*, belonging to the Microsporidia. Larvae examined from February 1914 were less infected. Brug considers that it is certain that this parasite of *Homalomyia scalaris* is identical with the *Octospora monospora* of *Drosophila confusa* and *D. plurilineata*.

The parasite is present in the gut epithelium of the larvae, or can live unharmed in the lumen of the gut. The meronts are rounded, with a compact nucleus. Dividing meronts show one to four aggregations of darker staining granules in the nucleus. Uninucleate meronts measure  $4\mu$  to  $5\mu$ . The meronts multiply by binary fission. Multinucleate forms result from delayed protoplasmic cleavage.

At spore formation, the meronts become curved, and are then sporonts. One sporont gives rise to one spore only. The spores are characteristic, elongate, curved or sickle-like in form. In many of the spores the nucleus is rod-shaped and is situated obliquely in the body. Striations parallel to the axis of the spore occur at one pole of the spore. Various chromatic structures present in the spore are described. No polar filament has been seen so far.

Two plates of 66 figures and 2 text-figures illustrate the paper. [The spores are somewhat like those of Sarcosporidia.]

H. B. F.

DARLING (S. T.). *Sarcosporidia encountered in Panama*.—*Jl. of Parasit.* 1915. Mar. Vol. 1. No. 3. pp. 113-120. With 5 figs.

The author has examined nearly one thousand animals in the course of routine work at Ancon, Panama Canal Zone. Sarcosporidia were seen in three new hosts, namely, opossum, hawk and sloth. The following animals were also found to be infected with Sarcosporidia

namely, horse, cow, hog, sheep, cat, man and rats, *Mus rattus* and *Mus norvegicus*. The infection is common, but it does not seem to be markedly pathogenic.

The author then briefly describes a number of Sarcosporidia from various hosts, including a sarcocyst of the hawk, *Leucopternis* sp.; a sarcocyst of the sloth, *Cholæpus didactylus*; a sarcocyst of the opossum, *Didelphis* sp., in the voluntary muscles and heart and in such non-muscular tissue as lungs and sub-maxillary gland; and a sarcocyst from a vagrant cat.

The sarcocysts found in the biceps of a young negro are of interest:—

“Examination disclosed small sarcocysts one-third to one-half the diameter of the muscle fiber, distended with vesicular sporoblasts. The parasite was of the minute or abortive type such as Negri and I have found in guinea-pigs fed with sarcocysts from the rat and differed from those described from the laryngeal muscle of a man by Baraban and St. Remy in that the latter were much larger, possessed sporoblastic chambers, and were of a more mature type. Four months after the parasite had been detected, another examination of tissue showed that apparently they had entirely disappeared.”

*Sarcocystis muris* was found in 15 rats out of 131. *S. tenella* was observed in a pet lamb brought from Peru. *S. miescheriana* was found in hogs that had died of swine fever. *S. fusiformis* was seen in two cows and in beef from Argentina. *S. bertrami* was detected in an old mule from the United States.

In an interesting discussion the author wonders whether Sarcosporidia are Neosporidian parasites of invertebrates which have become “sidetracked” in the tissues of vertebrates.

H. B. F.

MOROFF (Theodor.). **Zur Kenntnis der Sarkosporidien.**—*Arch. f. Protistenk.* 1915. Mar. 1. Vol. 35. No. 3. pp. 256–315. With 4 plates and 2 text figs.

The author has had the opportunity of examining much Sarcosporidia material from the slaughterhouses of Vienna and Sofia. The oesophagus of buffaloes especially was used and Sarcosporidia from sheep, cattle, horses and pigs were also examined. The younger Miescher's tubes were found in the deeper parts of the oesophagus.

Like many other workers, the author considers that the external striated layer of the tubes is derived from the muscle fibre of the host. The young spores contain metachromatic granules which are not present in older ones. A polar capsule has not been seen, but a wrinkling on young spores may simulate one.

A long discussion as to the origin of the spores (“sickles”) is given. The author thinks that Rainey's corpuscles are only spores seen in cross section, and that no sporoblast stage exists. A Miescher's tube in cross section shows an outer coarsely granular zone and an inner, finely granular matrix from which the spores differentiate. Two hypotheses as to their formation are put forward. In the first case, the inner zone forms spores, the outer continues its growth and division. The second opinion, held by the author, is that the growth of the spore zone arises from the apposition of new elements from the outer portion of the tube. The pansporoblasts are considered to become spores directly, the transition being very rapid and the processes involved somewhat variable.



A long argument, concerning the systematic position of the Sarcosporidia, concludes the paper, which is illustrated by four plates and two text-figures.

H. B. F.

ZSCHOKKE (E.). *Ein Rhinosporidium beim Pferd. Schweizer Arch. f. Tierheilkunde.*—1913. Dec. Vol. 55. No. 12. pp. 641–650. With 1 text fig.

The author briefly describes the structure of a nasal tumour found in a horse in South Africa in 1906. The tumour was round, and about the size of an egg. It was reddish and hard with a rougher outer surface. No pus was present. The swelling contained a Sporozoön parasite present in the submucosa of the septum nasi.

Microscopically, cysts of various sizes were seen. The smallest parasites were about as large as leucocytes. Many of the cysts measured  $30\mu$  to  $40\mu$  in diameter. A few reached  $120\mu$  to  $150\mu$ . The cysts possessed definite inner and outer walls, and were filled with round "sporocysts" lying in a faint-staining ground substance. Young "sporocysts" [pansporoblasts] were unicellular, older ones were  $6\mu$  to  $8\mu$  in diameter and contained four to six round spores or sporozoites.

Cysts emptied of their contents undergo leucocytic infiltration.

The parasite is considered to be a *Rhinosporidium*, allied to the parasite (*R. kinealyi*) described from the septum nasi of man in India by MINCHIN and FANTHAM in 1905\*. The author mentions having seen a similar organism in a section of a conjunctival tumour from a Japanese. [Similar growths in man have already been described by INGRAM† in India.]

A text-figure is given showing four stages of the equine parasite, and under the diagram is the name *Rhinosporidium equi*. A pore in the cyst wall is shown but not described.

[*Rhinosporidium* in man has also been found in the external auditory meatus by BEATTIE and on the penis by INGRAM. The geographical distribution of the human parasite so far recorded is India, Ceylon, Tennessee and Argentina. Now that *Rhinosporidium* has been found in horses in South Africa, it would be advisable to search for it in man in that country, and to endeavour to determine its mode of transmission.]

H. B. F.

TIRUMURTI (T. S.). *Rhinosporidium kinealyi.*—*Practitioner.* 1914. Nov. Vol. 93. No. 5. pp. 704–719. With 3 plates.

The author gives a brief historical survey of previous work in India on *Rhinosporidium kinealyi*. He then reports upon fifteen cases of the occurrence of the parasite in the neighbourhood of Madras and the Malabar coast. Of these infections 8 were of the nature of nasal polypi, 3 were naso-pharyngeal growths, 3 others were on the conjunctiva, while the remaining one was a papillomatous growth of the penis, an illustration of which is given.

\* *Quart. Jl. Microsc. Sci.*, vol. 49, p. 521.

† *Lancet*, 1910, Sept. 3, p. 726.

The clinical features of the rhinosporidial growths are set forth. In the nose they are soft, polypoid, papillomatous and very vascular. They resemble a raspberry and are "suggestive of the colour of Jumbulum fruit." "In one of the cases reported, the patient was able to draw into and blow out of the nose a mass of soft velvety deep red polypi." The removal of the growths is always difficult as they are very friable, and there is a tendency to severe bleeding. Even after previous cauterization, there is a tendency to recurrence.

The conjunctival polypi are similar in character and occur both on the bulbar and palpebral conjunctiva. The growth on the penis started near the urethral orifice, the tip of the penis "was enlarged to about the size of a baby's fist and presented a most peculiar cauliflower polypoid appearance." The meatus was in the middle of the growth and was dilated, and there was no pain and no difficulty in micturition. Irritation was first noticed at the meatus seven or eight years previously, and the growth was observed about two years after. This case has been described already by INGRAM in 1910.

In fresh specimens of polypi small white spots about the size of pin points are seen and these contain spherical cysts. In sections the mucous membrane is seen to be thrown into irregular folds. There is infiltration of the sub-epithelial tissue with leucocytes, and parasitic cysts are found therein. A pore occurs in the cysts and is best seen in those not quite fully grown. A brief illustrated account of the life-cycle is given, more especially based on the work of MINCHIN and FANTHAM\* (1905) and of BEATTIE† (1906). The author considers that no intermediate host is necessary for the transmission of the parasite. He gives a diagram of what he supposes to be the life-cycle, but there are no new stages shown in it. Attempts at inoculation into guinea-pigs failed during a period of observation of two months. Attempts at culture also failed.

The author concludes that the nasal and conjunctival polypi are contracted "by direct inoculation through infected clothing, handkerchiefs, or the hands. The spores are discharged in the nasal secretion." The parasites are probably transmitted by the contaminative method. The case of a student is mentioned, who probably contracted rhinosporidiosis while living with an infected fellow student. The possibility of polypi occurring in "the mucous membrane of the mouth, anus and vagina" is noted. The cases recorded by the author occurred in males between the ages of 10 and 60 who were natives of India.

[*Rhinosporidium kinealyi* was first reported in India from Calcutta. It is a Sporozoön belonging to the sub-class Telosporidia, order Haplosporidia, as was shown by MINCHIN and FANTHAM (1905), and is a member of the sub-order Polysporulea created by RIDWOOD and FANTHAM in 1907.

Regarding the author's remark that *Rhinosporidium* is likely to occur in the external auditory meatus, he appears to be unaware that BEATTIE‡ (1907) has already described the parasite from this situation. As to "*Rhinosporidium* being a misnomer," a generic name once given must stand.]

H. B. F.

\* *Quart. Jl. Microsc. Sci.*, vol. 49, p. 521.

† *Jl. Path. & Bact.*, vol. 11, p. 270.

‡ *Brit. Med. Jl.*, 1907, Nov. 16, p. 1402.

MESNIL (F.). **Sur la position systématique des Hémosporidales.**—*Bull. Soc. Path. Exot.* 1915. Apr. Vol. 8. No. 4. pp. 241-244.

The author considers the genera *Plasmodium* (including *Laverania* and *Proteosoma*) and *Haemoproteus* (*Halteridium*) to be very closely allied. It is thought that the genus *Haemocystidium* is too little known for its validity to be certain. The genus *Leucocytozoon* is a member of the Haemosporidia.

The grouping of the three families, Plasmodiidae (or Haemamoebidae), Haemogregarinidae and Piroplasmidae, in the order Haemosporidia is considered by the author to be no longer possible, because of the coccidian nature of the Haemogregarines. The Coccidia are divisible into the Adeleidea and the Eimeridea. The Haemogregarinidae are allied to the former, and the Plasmodiidae to the latter. The Piroplasmidae, until more is known of the life-cycle in the invertebrate host, cannot be more definitely placed.

The author considers the name Haemocytzoa to be preferable to that of Haemosporidia, which, he thinks, includes a heterogeneous assemblage with general characters in common with the Coccidia. The name Haemocytzoa, however, is not taxonomic but refers only to the habitat of the parasites.

Regarding the controversy as to the relative claims of the names *Piroplasma* and *Babesia*, the author, in a footnote, retains the former. He very wisely remarks that it is inadvisable to give the same name to any two Protists, notwithstanding that one may be animal and the other plant.

H. B. F.

PICK (Ernst P.) & WASICKY (R.). **Ueber die Wirkung des Papaverins und Emetins auf Protozoen.**—*Wien. Klin. Woch.* 1915. June 3. Vol. 28. No. 22. pp. 590-591.

This paper records a number of experiments made in Vienna on the action of solutions of various concentrations of quinine hydrochloride, emetine hydrochloride, papaverine hydrochloride, narcotine hydrochloride and morphine hydrochloride on certain Protozoa. The object of the research was to find a substitute for emetine, the latter being imported into Austria-Hungary from abroad.

The Protozoa experimentally treated were *Paramaecium caudatum*, *Colpidium colpoda* and freshwater amoebae. *Trypanosoma brucei* was also used. The method employed was the examination of coverslip, hanging drop and moist chamber preparations of the protozoa, mixed with definite concentrations of the drug under test. The strengths of the drug solutions were 1 per 100, 1,000, 10,000 and sometimes 1 per 50,000 and 100,000.

One per cent. solutions of the hydrochlorides of quinine, emetine and papaverine killed *Paramaecium caudatum*, *Colpidium colpoda* and the amoebae instantly. The maximum dilution of quinine hydrochloride that killed *Paramaecium caudatum* was 1 per 100,000, the time being 1 hour 29 minutes. The same dilution of emetine killed in 2 hours, while papaverine hydrochloride of 1 per 50,000 killed in 2 to 8 hours. Similarly, *Colpidium colpoda* was destroyed by a 1 per 50,000 solution of quinine in 2 hours, by the same strength solution of emetine in 2½ hours, while a corresponding solution of papaverine was

fatal in 3 hours. Freshwater amoebae treated with a solution of 1 per 10,000 of quinine, emetine and papaverine hydrochlorides were dead after 1, 5 and 2 hours respectively. Narcotine hydrochloride behaved like papaverine. Morphine hydrochloride in 1 per cent. solution had little or no effect even after 24 hours exposure.

*Trypanosoma brucei* was killed by a solution of 1 per cent. emetine hydrochloride in 15 minutes, while a similar solution of papaverine killed it in 3 to 7 minutes.

The author considers that his experiments show that emetine and papaverine have an intense poisonous action on the protozoa experimented upon. In some cases, papaverine was superior to emetine. Narcotine is similar to papaverine in its action. The isoquinoline derivatives of the opium alkaloids, papaverine and narcotine, are poisonous to protozoa, while the phenanthrene derivative, namely morphine, is free from such properties.

The author suggests that the treatment of amoebic dysentery and other protozoal diseases, such as balantidiasis, by papaverine has advantages over treatment by emetine, and the effects of emetine on the heart and bloodvessels may be avoided by using papaverine. Also, papaverine costs only about one-twentieth as much as emetine, and is not obtained from overseas. The concluding remark is a warning that there is no proof that papaverine will behave like emetine in the bodies of men and animals, but that its use might be tried in an outbreak of amoebic dysentery.

[The fallacy of testing drugs intended for use in amoebic dysentery on free-living ciliates, freshwater amoebae and *Trypanosoma brucei* observed in vitro is obvious. EHRLICH, among others, has warned investigators against generalisations based on laboratory experiments only, and the authors of this paper have repeated the warning, which, considering their material and methods, must be carefully borne in mind.]

H. B. F.

KOLMER (John A.). **A Method of transmitting Blood Parasites.**—*Jl. Infect. Dis.* 1915. Mar. Vol. 16. No. 2. pp. 311-312.

The author, while engaged on chemotherapeutic researches with white rats experimentally infected with various trypanosomes and spirochaetes, tried a new method for obtaining small quantities of blood for inoculating new hosts. By this technique, "sufficient blood is obtained from the heart in an aseptic manner to infect a large series of rats without killing or seriously injuring the stock or seed animal. For the purpose of propagating a strain of trypanosomes by infecting one or two rats at regular intervals, the method has been found likewise serviceable, as a small amount of blood may be obtained aseptically and at frequent intervals without injury to the stock animal. The seed rat is fastened to an operating board or held by a gloved assistant and the cardiac area determined by palpation."

The hair and skin over the cardiac area are sterilized by application of iodine. "A test tube of sterile 1 per cent. sodium citrate in normal salt solution is warmed by heating in a Bunsen flame and a sufficient amount drawn carefully into a sterile 1 or 2 cc. Record syringe, fitted with a medium-sized needle (No. 22), in such a manner as to

avoid contamination." The smaller syringe is used when few injections are to be made, the larger one when many rats are to be inoculated. The syringe is only partly filled with the citrate-salt solution, sufficient space being allowed for suction by withdrawal of the piston when the needle has been passed into the heart.

"The skin over the cardiac area is drawn taut by the forefinger and thumb of the left hand without touching the site of puncture and the needle quickly entered into the heart, directed slightly upwards and toward the spine. No attempt is made to enter any particular chamber of the heart. At once, blood flows into the syringe. The action may be facilitated by gentle suction, although usually this is not necessary. When sufficient blood is obtained the needle is quickly withdrawn, the contents of the syringe are mixed by gentle agitation, and the animal returned to the cage."

A dilution of blood equivalent in density to a 1 per cent. suspension of erythrocytes is used in the case of heavily infected animals, while a correspondingly heavier emulsion is prepared if the parasites are few in number in the seed rat.

"By this method the whole procedure is quickly conducted in a sterile manner and only in exceptional instances is the animal seriously injured or killed by the operation. It is important to use a sharp-pointed needle, and one not so large as to unnecessarily injure the heart and not so small as to hinder the flow of blood."

H. B. F.

**MACNEAL (Ward J.) & SCHULE (Paul A.). An Efficient and Convenient Stain for Use in the General Examination of Blood Films.—*Post Graduate*. 1913. Nov. 6 pp.**

After remarking on the Romanowsky stain and the various modifications of it due to LEISHMAN and to GIEMSA, it is pointed out that MACNEAL in 1906 showed that the ability of these stains to differentiate chromatin is due to the presence therein of both methylene azure and methylene violet. The combination of methylene azure with eosin seemed to decompose somewhat in alcohol, with oxidation of the latter, and deterioration. However, solutions of the four dyes, methylene blue, methylene azure, methylene violet and eosin in methyl alcohol were prepared and found to be satisfactory.

The present investigation concerned the advisability of making two permanent solutions, the one containing eosin, the other containing methylene blue and its derivatives. Methylene azure may be purchased under the name of Giemsa's "Azure 1." Crude methylene violet was obtained through Ernst Leitz.

Two stock solutions were prepared as follows :—

*Solution A—*

Eosin, water soluble, yellowish	..	..	..	1
Methylic alcohol, Merck's "Reagent"	..	..	..	500

The dye dissolves readily with a little shaking.

*Solution B—*

Methylene blue, medicinally pure	..	..	..	1
Methylene azure	..	..	..	0.20
Methylene violet, commercial	..	..	..	0.60
Methylic alcohol, Merck's "Reagent"	..	..	..	500.00

"The dyes are thoroughly rubbed up in a perfectly clean mortar with a few drops of the alcohol so as to form a homogeneous paste. This is then transferred to a bottle (capacity 500 cc.) and the mortar is carefully washed clean with successive portions of methylic alcohol, which are subsequently poured into the bottle. The remainder of the 500 cc. of methylic alcohol is added, the bottle thoroughly shaken, stoppered loosely and immersed in warm water (50 deg. C.) for a time and again thoroughly shaken. It is well to keep it in a warm place for a few days, shaking it at frequent intervals so as to separate the dyes from the insoluble residue and bring them completely into solution. Filtration is unnecessary. These solutions are kept in amber bottles in a dark place and remain in good condition for several months. Small equal portions (30 cc.) are mixed together to form the staining solution, which is then ready for immediate use and keeps well for a few weeks.

"The staining method is that described by Leishman and already too well known to require more than a hasty description. To a freshly made, thin, dry blood film one adds the staining solution, allows it to stand one minute, then dilutes with about an equal amount of distilled water and allows this resulting mixture to act 2 to 3 minutes, then washes in distilled water until the desired differentiation is reached, and dries the preparation between filter papers. If the preparation is to be mounted in balsam or in cedar oil it should be very thoroughly dried, best by standing for a day in the incubator before mounting."

The above formula has been tested by the authors for ten months, and has given them satisfaction in routine blood work.

H. B. F.

**RUSSELL (Frederick F.). A Combined Staining Method for Malarial Parasites and Blood Smears.—*Jl. Amer. Med. Assoc.* 1915. June 26. Vol. 64. No. 26. pp. 2131-2132.**

The author discusses the relative merits of Manson's borax methylene blue and the various modifications of the Romanowsky stain due to LEISHMAN, WRIGHT, HASTINGS, MacNEAL and GIEMSA. He considers that the latter fail to stain the cytoplasm of the malarial parasite with sufficient sharpness and intensity.

The author states that "it is evident that an ideal picture would result if the best of the methyl alcohol chromatin [Romanowsky] stains could be combined with Manson's cytoplasmic stain. After several attempts the following method was found to give the best results and it has been used for the routine of the laboratory [at Ancon, Panama Canal Zone] for thousands of blood preparations:—

"1. Fix and stain for two minutes in Wright's or similar methyl alcohol stain. It is most convenient and economical to use about 15 cc. of stain in a Coplin jar; the top should fit well to prevent evaporation and the stain may be used repeatedly.

"2. Without washing, transfer the slide to a glass of tap water for from three to five minutes.

"3. Without washing, transfer to diluted Manson's stain for from twenty to forty seconds. One-half cc. (7 drops) of Manson's stain to 50 cc. of tap water in a Coplin jar gives about the proper strength. This staining fluid in concentrated form keeps well, but the diluted stain should be freshly prepared each day.

"4. Wash quickly in tap water, dry and examine."

Manson's stain "is made by dissolving 5 gm. of borax in 100 cc. of boiling water and adding 2 gm. of methylene blue, medicinally pure; when cool the volume is made up to 100 cc. and the stain is ready for use."

[Apparently the author is unaware that some ten years ago BILLET devised a similar stain for the same purpose, namely, the intensification

of the staining of the cytoplasm. It consisted in adding sodium carbonate to methylene blue, and the addition of a few drops of this mixture to the azure II and eosin of Giemsa. See *C. R. Soc. Biol.* (1906), vol. 61, p. 753. The reviewer has used BILLET's stain and finds that it gives excellent results, even with such difficult subjects as the *Spirochaetes* of molluscs.]

H. B. F.

CARINI (A.). *Corps de Graham-Smith dans les Hématies du Mus decumanus*.—*Bull. Soc. Path. Exot.* 1915. Mar. Vol. 8. No. 3. pp. 103–104.

The bodies of Graham-Smith, first seen in the red blood corpuscles of moles in 1905, were found by the author in the blood of a large *Mus decumanus* killed at São Paulo, Brazil. The rat was quite healthy. The parasitised corpuscles showed no alteration, but polychromatophile red cells and others containing Anaplasma-like granules were also present. The Graham-Smith bodies were more numerous in the blood from the internal organs.

The bodies were coccoid or bacilliform, and measured  $1\mu$  by  $0.2\mu$  to  $0.3\mu$ . The number in a corpuscle varied from six to twenty. They were coloured blue by Giemsa or Pappenheim stains.

This is the first record of these structures in America, and if organismal the name *Grahamella muris* is proposed.

H. B. F.

CARINI (A.) & MACIEL (J.). *Sobre o Pneumocystis carinii*.—*Annaes Paulistas de Medicina e Cirurgia*. 1914. June. Vol. 2. No. 6. pp. 170–173. With 1 coloured plate.

The authors state that the parasite, *Pneumocystis carinii*, occurs in the lungs of non-trypanosome-infected animals. Among the animals which have already been found infected are rats, guinea-pigs, rabbits, dogs, cats, lambs and goats. The parasite was first described by DELANOË [see this *Bulletin*, Vol. I, p. 58, and Vol. 3, p. 523]. It has only been found in the lungs, and its pathogenicity is slight. It occurs in round or slightly oval capsules, about  $5\mu$  in diameter, containing eight merozoites often arranged in a rosette. No blepharoplast was observed. Some cysts contain larger merozoites regularly arranged, others contain smaller merozoites somewhat irregularly disposed and pale staining. The pneumocysts are usually free and only occasionally intracellular. DELANOË thinks that the parasite is transmitted by contact, and Carini and Maciel suggest that this may occur in coughing. Feeding experiments were not conclusive. Pneumocysts have no relation to the life-cycle of trypanosomes, and the authors state that CHAGAS and ARAGÃO now accept this view.

The paper is illustrated by a coloured plate of 26 figures representing the morphology of the organism.

H. B. F.

CARINI (A.) & MACIEL (J.). Sur un hémogregarine et un trypanosome d'un Muridé (*Akodon fuliginosus*).—*Bull. Soc. Path. Exot.* 1915. Apr. Vol. 8. No. 4. pp. 165–169. With 2 text figs.

One of the authors having visited Apiahy, in the south-east of São Paulo, Brazil, to investigate the cause of death of numerous rats there, found that they had died of starvation due to the lack of their usual vegetable food. Some of the same rodents, *Akodon fuliginosus*, were caught and were found to contain a (Leuco) Haemogregarine and a trypanosome in their blood. Both organisms are considered to be new species.

(Leuco) *Haemogregarina akodoni* is reniform in shape, its dimensions being  $10\ \mu$  by  $3.5\ \mu$ . It occurs in large mononuclear cells, whose nuclei tend to fragment. The nucleus of the free vermicle measures  $4\ \mu$  by  $2.5\ \mu$ . The parasites observed were all at the same stage of development. They were most abundant in lung smears and occurred in fewer numbers in the liver, bone-marrow and kidney. No schizogonic stages were seen. The organisms were present in 4 out of 12 rats examined, and the latter seemed unaffected by the parasite.

*Trypanosoma akodoni* occurred in the blood of the rats that harboured the haemogregarines. They were not numerous. Their total length including the flagellum was  $19\ \mu$  to  $22\ \mu$ , the free flagellum being  $5\ \mu$ . The breadth was  $2\ \mu$  to  $2.5\ \mu$ . Morphologically, the trypanosome resembled *T. cruzi*, as it possessed a rather large blepharoplast, and so differed from *T. lewisi*. Attempts to inoculate laboratory animals and to infect larvae of the bug, *Triatoma infestans*, were unsuccessful.

H. B. F.

SANGIORGI (Giuseppe). Sulla Natura dei Cosidetti "Corpi di Kurloff"  
[On the Nature of the so-called Kurloff Bodies].—*Pathologica.*  
1915. June 1. Vol. 7. No. 158. pp. 263–266.

The first part of the paper deals with the chief hypotheses that have been advanced as to the nature of the so-called Kurloff bodies. These hypotheses on the one hand formulate that the structures are organismal, on the other that they are inanimate. Six of these hypotheses are summarised, namely, those in which the bodies are considered to be either vacuolar secretory products of the mononuclear leucocytes of guinea-pigs, protozoa (either flagellates, Leucocytozoa or Cytoryctes), phagocytic products, Chlamydozoa, archoplasmic products, or spirochaetes.

The author found Kurloff bodies in the lungs and spleen of guinea-pigs. To test the possible transmissibility of the bodies he inoculated white rats intraperitoneally, subcutaneously and intramuscularly with heavily infected lung and spleen emulsion obtained from guinea-pigs. He also fed rats with similar material. The results were always negative. To determine whether the bodies had a definite structure, the author examined fixed and stained material, both smears and sections. No satisfactory cellular structures were seen in the Kurloff bodies. Sections of the lung, and sometimes of the spleen, were stained



with Sudan III. It is concluded that there is a lipid perivacuolar zone, together with endovacuolar sudanophile granulations. The granules are considered to be in part of a lipid nature.

In his conclusions the author states that the so-called Kurloff bodies are neither parasitic nor protozoal in nature. They cannot be transmitted experimentally, and they do not show structures corresponding to any protozoön. He agrees with various workers that the bodies are not organismal, but are vacuolar formations in the mononuclear leucocytes of guinea-pigs, containing an autogenous fluid secretion. The results of his researches show that the endovacuolar secretion has in part a lipid nature.

H. B. F.

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#### ERRATUM.

Vol. 5. No. 6. p. 388, ten lines from bottom —*for* dissolved in 10 per cent. acetone *read* in ten per cent. solution in acetone.

## RELAPSING FEVER.

**DRAKE-BROCKMAN (R. E.).** On an Epidemic of African Tick Fever among the Troops in British Somaliland.—*Trans. Soc. Trop. Med. & Hyg.* 1915. June. Vol. 8. No. 7. pp. 201-207.

This consists of a more complete description of an epidemic of African relapsing fever at Bulhar, British Somaliland [see this *Bulletin*, Vol. 5, p. 231], which is apparently transmitted by *Ornithodoros savignyi*, a tick which bites both by day and night. The author adds some interesting notes on the biology of this tick and describes the disease in some detail.

In the course of the discussion following this paper Dr. C. J. BAKER mentioned that in 1910 some troops went from Uganda to Somaliland and possibly took a spirochaete with them, which may have lain dormant or unrecognised until 1912.

E. Hindle.

**MACFIE (J. W. Scott).** Bronchial Spirochaetosis.—*Jl. Trop. Med. & Hyg.* 1915. Mar. 15. Vol. 18. No. 6. pp. 63-65.

The author describes two cases of bronchial spirochaetosis that have recently come under his notice at Accra in the Gold Coast Colony. After mentioning the clinical symptoms of these patients, he goes on to describe the morphology of the spirochaetes occurring in the sputum.

In both cases the parasites presented the same appearance and were of about the same magnitude. They stained well, but faintly, with Romanowsky, but gentian violet was better for bringing out details. The average length is 8 to 9 $\mu$  and there are three to four spirals; the breadth is about 0.25 $\mu$ . The spirochaetes taper at both ends and in general appearance resemble those figured by CHALMERS and O'FARRELL from the Sudan, but are distinctly shorter.

Spirochaetes indistinguishable from these were found to occur normally in the mouths of healthy natives, and it is suggested that in the two patients mentioned by the author the disease of the bronchi and lungs may have been due to an invasion of these organs by these parasites as the result of some predisposing factor that is at present obscure.

E. H.

**FANTHAM (H. B.).** *Spirochaeta bronchialis*, Castellani, 1907, together with Remarks on the Spirochaetes of the Human Mouth. (Being the First Report of the Thirty-first Expedition of the Liverpool School of Tropical Medicine, to Khartoum, 1913).—*Ann. Trop. Med. & Parasit.* 1915. July 31. Vol. 9. No. 3. pp. 391-412. With 1 plate.

*Spirochaeta bronchialis* and the disease which it is supposed to produce in man have recently been the subject of various publications, in which, however, more attention has been paid to the disease itself than the causative agent. In the present publication the author describes in detail the parasite itself, and in addition adds notes on (C183)

the spirochaetes of the human mouth and contrasts these organisms with *S. bronchialis*. The author's summary and conclusions embodying the contents of his paper are as follows:—

"1. *Spirochaeta bronchialis* is an organism presenting marked polymorphism, a feature that has only been determined by the examination of numerous preparations from various patients. It produces bronchial affections in the Sudan and in other parts of the world.

"2. *S. bronchialis*, as investigated in the Anglo-Egyptian Sudan, varies in length from  $5\mu$  to  $27\mu$ , and its breadth is about  $0.2\mu$  to  $0.6\mu$ . These variations are due to the processes of growth and division. Many of the parasites measure either  $14\mu$  to  $16\mu$  long, or  $7\mu$  to  $9\mu$ , the latter resulting from transverse division of the former. The ends show much variation in form, but approach the acuminate type on the whole. The discrepancies in dimensions given by the very few previous workers on *S. bronchialis* are the result of the measurement of a limited number of parasites. All such sizes can be found on some occasion during the progress of the disease, when a larger number of spirochaetes is examined.

"3. The movements of *S. bronchialis* are active, but of relatively short duration, when it is removed from the body. The number of coils of the spirochaetes is rather an index of its rapidity of motion than a fixed characteristic of the species.

"4. The motile phase of *S. bronchialis* is succeeded by one of granule formation, the granules or coccoid bodies serving as a resting stage from which new spirochaetes are produced. The formation of coccoid bodies and the reproduction of spirochaetes from them can be observed in life.

"5. *S. bronchialis* is a species distinct from the spirochaetes occurring in the mouth. It differs from them in morphology, pathogenicity and in staining reactions. It is not a developmental form of any bacterium, and is an entity in itself.

"6. The passage from man to man is effected most probably by means of spirochaetes, and especially coccoid bodies, that leave the body in the spray with expired air and by the way of the nasal secretions. Owing to the fragility and short life of *S. bronchialis* extracorporeally, the resistant coccoid bodies in air, dried sputum and dust, and possibly also on the bodies of flies and other insects, are probably instrumental in inducing attacks of bronchial spirochaetosis in human beings, especially those having a lowered bodily resistance, such as after a chill.

"7. Spirochaetes of the type of *S. dentium*, measuring  $4\mu$  to  $10\mu$  in length, have been found in mouths of natives of the Sudan and in those of English people in England. Also *S. buccalis*, measuring  $9\mu$  to  $22\mu$ , has been obtained from the same sources.

"8. *S. bronchialis* will probably prove to be of more frequent occurrence than is known at present.

E. H.

WALKO (Karl). Ueber das Rückfallfieber. [Relapsing Fever.]—*Wien. Klin. Woch.* 1915. May 13. Vol. 28. No. 19. pp. 491-494.

The author brings together his notes on 190 cases of European relapsing fever (*S. recurrentis*) occurring amongst soldiers from Serbia.

He remarks that although relapsing fever is very characteristic in its clinical symptoms, it is necessary to take into consideration a number of characters in order to distinguish it, as different epidemics may be of varying types.

The article consists mainly of a detailed account of the clinical symptoms, in the course of which a case is mentioned of reinfection occurring only eleven weeks after the first infection, so it is evident that the immunity is of very short duration. The mortality in these 190 patients was only 2.6 per cent., but in certain cases recovery was extremely slow, convalescence lasting for two or three months.

The following cases of mixed infection were observed :—With cholera, 25 cases ; with typhoid, 14 ; with typhus, 5 ; with dysentery, 3 ; and with epidemic meningitis, 1 case.

Salvarsan and neosalvarsan were used with success for the treatment of the infection. In some cases the neosalvarsan was injected during the interval between two attacks and in only two cases were there any further relapses, thus showing that the persistent stage of the spirochaete is not resistant to arsenic. When the patients received 0·6 gm. of neosalvarsan administered intravenously relapses were only observed in 5 per cent. of the cases, but after smaller doses, especially when given intramuscularly, a larger number of relapses occurred. In all cases, however, these relapses were very mild in character, only consisting of a slight rise in temperature.

E. H.

JARNO (Leo). *Die Mitbeteiligung der Nieren bei Rückfallfieber.* [The Part played by the Kidney in Cases of Relapsing Fever.]—*Wien. Klin. Woch.* 1915. Apr. 22. Vol. 28. No. 16. pp. 416-417. With 1 chart.

The author has examined the urine of patients suffering from relapsing fever and finds that during each febrile attack albumin and granular casts appear in the urine. A curve is given showing the percentage of albumin in the urine during the successive attacks of a case of relapsing fever and from this it appears that during each febrile period there is about 0·5 per cent. to 1·5 per cent. of albumin present in the urine.

This albuminuria is no contra-indication against the use of salvarsan or neosalvarsan.

In only two out of 170 cases was haemorrhagic nephritis observed and although searched for repeatedly, spirochaetes were only once found in the urine.

E. H.

PAPENDIECK (Rudolf Max). *Neosalvarsanbehandlung bei Rückfallfieber.* [The Treatment of Relapsing Fever with Neosalvarsan.]—*München. Med. Woch.* 1915. Apr. 20. Vol. 62. No. 16. p. 545. With 1 chart.

The record of a case of European relapsing fever in a Russian which was cured by two injections of neosalvarsan. The first injection (0·6 gm.) was administered when spirochaetes were numerous in the blood and caused the temperature to fall within half an hour. A second injection of 0·3 gm. was administered ten days later as spirochaetes were still present in the circulation and the fever had returned. After this injection the parasites disappeared and the temperature returned to the normal.

E. H.

MUEHLENS, HEGELER & CANAAN. **Misserfolge der Arrhenalbehandlung bei Rückfallfieber.** [The Failure of Arrhenal Treatment for Relapsing Fever.]—*München. Med. Woch.* 1915. May 25. Vol. 62. No. 21. pp. 710-711.

In an article published in 1912 SCHNEIDER\* stated that relapsing fever could be cured by doses of 0.05 gm. arrhenal. The authors attempted to treat some cases of Russian relapsing fever with this medicament and found that it did not affect the course of the disease, even though administered intravenously in doses of 0.2 gm. per day. Arrhenal, therefore, is apparently of no use in the treatment of this disease.

E. H.

AOKI (K.). **Studium über die Atoxylwirkung und die Immunität bei Hühnerspirochäten.** [Studies on the Action of Atoxyl and Immunity in Fowl Spirochaetosis.]—*Zeitschr. f. Immunitätsforsch.* 1. Teil. Orig. 1914. Nov. 7. Vol. 23. No. 2. pp. 127-203. With 6 text figs.

In this exhaustive article the author gives extensive references to the literature on the subject and derives his conclusions both from the results of numerous original experiments and also those of previous investigators. In the present place it is impossible to give more than the main conclusions, and for further details the original paper should be consulted.

With regard to agglutinins, these are formed within a short time of the injection of atoxyl into a fowl suffering from spirochaetosis and their formation goes parallel with the disappearance of the parasites. At the same time agglutinin formation goes up very suddenly during the natural crisis of a recovered individual. By the action of atoxyl apparently, a protective condition is produced against the infection before the spirochaetes quite disappear from the circulation. This condition is of a specific nature and is transmitted passively through the serum of normal animals. Moreover it has the properties of a true immunity and does not seem to follow the death of the spirochaetes, but rather to be the cause of their destruction.

Atoxyl acts better as a curative than a protective agent. Animals which were injected at the same time with atoxyl and spirochaetes were protected against the infection only if they gave a strong reaction and quickly showed signs of sickness.

For example fowls were injected with a larger quantity of blood containing spirochaetes and at the same time with a curative dose of atoxyl. Those animals which soon showed signs of sickness were all protected against subsequent attempts to infect them with spirochaetosis. On the other hand those fowls which were quite lively after the injection later developed the infection and succumbed.

The author suggests that the affinity between the body-cells and the medicament in some way is increased by the connection between the body-cells and parasite so that eventually three factors, viz. body-cells, parasites and medicament react together quite freely within the body of the host.

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\* *Archiv. f. Schiffs- u. Tropen-Hygiene*, 1912. Vol. 16, pp. 150-162.

Atoxyl is so influenced by normal blood or blood-cells that *in vitro* trypanosomes are destroyed by a mixture of blood and atoxyl whilst this is not the case with spirochaetes. These results are the same whether the atoxyl is mixed with normal or infected blood. It is evident from the results of various authors that the action of atoxyl is increased after injection into the blood.

The above mentioned trypanosomes were not affected by the serum of an infected fowl that had been injected with a curative dose of atoxyl. On the other hand spirochaetes were destroyed by such serum taken from a fowl after the parasites had disappeared from its blood.

If infected fowls are injected with a very large dose of atoxyl so that they are strongly poisoned, the parasites are not destroyed, as the toxic effects of the drug apparently interfered with the reaction of the organism necessary for the destruction of the spirochaetes.

In a mixture of blood and atoxyl in which the trypanocidal effect was strongest, agglutination of the blood-cells was most distinct and also auto-haemolysis was most evident.

In the second part of the paper the author discusses various serum reactions of the parasite:—

(a) *Precipitin reaction*.—Employing spirochaete extract a feeble reaction can be obtained against immune serum, but a reaction is sometimes produced against normal serum, so it is useless to apply this method for diagnostic purposes.

These precipitin reactions vary with the severity of the infection. When it is fatal the reaction against spirochaete extract is more feeble, however distinct may be the reaction between this and immune serum. The reaction is checked after treatment with atoxyl.

(b) *Agglutination reaction*.—As in the case of ordinary bacteria this reaction is both easy and convenient to recognise *in vitro*, employing the serum of immunised animals. The serum of infected fowls, whether spirochaetes are present in the circulation or not, produces strong agglutination. If the spirochaetes are washed, or kept in the ice-chamber for a long time their agglutinating properties are lost, but although the reaction is slow, good agglutination can be obtained with heated spirochaetes.

When the parasites disappear after the crisis, the agglutinating properties of the serum rise very suddenly. The agglomeration of the spirochaetes that can be observed at the height of the infection is proof of the presence of agglutinins in the serum.

(c) *Fixation of the complement*.—This reaction could be detected either with spirochaete extract or the tissues of highly immunised animals.

(d) *Anaphylaxis*.—Fowls can be made anaphylactic with fowl spirochaetes, but the reaction is not so distinct as that produced by treating guinea-pigs with bacteria. With large quantities of spirochaetes it is possible to demonstrate the presence of anaphylotoxin without the aid of immune serum.

Guinea-pigs can be actively sensitized by spirochaetes.

(e) *The influence of physical and chemical changes on the properties of the antigen*.—Fowls can be immunised against spirochaetosis by the

injection of infected serum freed from spirochaetes by heating, washing with chloroform and drying at 55° C for 24 hours. Although the antigen is not lost after this treatment, the addition of iodine at once destroys all its properties.

(f) *Spirochaetolysis*.—When mixed with immune serum spirochaetes show the same changes as occur in bacteriolysis, *viz.* immobilisation, agglutination, swelling, loss of staining properties, loss of form, breaking into fragments. Guinea-pig serum is not so suitable for complement as fowl serum.

(g) *Phagocytosis*.—This appearance and likewise the presence of immune bodies can be demonstrated *in vitro*. According to the author's observations there is also a second phenomenon accompanying it, as the spirochaetes were deformed quite independently of the leucocytes.

E. H.

**WOLBACH (S. Burt).** On the Filterability and Biology of Spirochaetes. —*Amer. Jl. Trop. Dis. & Prevent. Med.* 1915. Feb. Vol. 2. No. 8. pp. 494–505. With 2 plates.

The author discusses the filterability, morphology and distribution of *Spirochaeta duttoni* and the filterability, morphology and biology in cultures of *Spirochaeta elusa*, and a new filterable spiral organism from human faeces.

With regard to *Spirochaeta duttoni* in ticks, the author has examined stained sections of a series of ticks fed on animals containing spirochaetes in their circulation. His results support those of MARCHOUX and COUVY and are opposed to the view that the granules found in epithelial cells come from spirochaetes.

The parasites were found to pass unchanged to all parts of the tick's body and although so-called encysted and coiled forms were observed they are not regarded as having anything to do with multiplication.

*Spirochaeta elusa*, an organism which grows well in dilute hay infusions of neutral or slightly acid reaction, showed the presence of granules, and lateral projections and swellings. Attempts to prove that coiled, encysted and swollen forms are capable of reproduction failed. This spirochaete passes through the Berkefeld N and W filters and repeated filtration has greatly enhanced its motility and filterability, so that whereas in the earlier generations the proportion of successful to unsuccessful filtrations was as 12 to 2, after about 75 passages through the filters there was practically 100 per cent. of successful filtrations. Spirochaetes were observed in the filtrate and also actually passing through the pores of the filter.

*Spirochaeta biflexa* resisted every attempt at subculture although over a hundred different conditions were provided, all based upon the character of the filtrate in which the growth occurred. The spirochaete from human faeces was cultivated at 37° C. in meat infusion bouillon in which it produces a white tenacious slime. Pure cultures were filterable through Berkefeld filters in one and a half to three hours by gravity.

The author's conclusions are as follows :—

"1. That the method of filtration as a means of separating spiral organisms from ordinary bacteria will probably hold good for other saprophytic and pathogenic spirochaetes and allied micro-organisms.

"2. That organisms larger than many bacteria will pass the Berkefeld V, N, and W filters, namely, *Spirochaeta duttoni*, and the ones we have tentatively called *Spirochaeta elusa*, *Spirochaeta biflexa* and the spiral organism from the colon of man which is probably the organism commonly recognized in preparations as an 'intestinal spirochaete.'

"3. That there is no evidence of spirochaetes multiplying by any other method than single fission. It is certain that the granules, coiled forms and swollen terminals of the spiral organisms cultivated by us are not capable of multiplication in any form."

E. H.

BRONFENBRENNER (J.). **A New Principle in Isolation of Spirochetes in Pure Culture.**—*Proc. Soc. Experim. Biol. & Med.* 1915. Mar. 17. Vol. 12. No. 6. pp. 136-137.

Owing to bacterial contamination the author had great difficulty in attempting to isolate certain strains of spirochaetes, and numerous attempts at purification, using NOGUCHI's original method, failed for months. Having noticed that certain antiseptics in proper quantities exerted a marked accelerating action on the growth of spirochaetes, media were prepared containing salvarsan in very small amounts and finally after ten passages strains of spirochaetes were obtained which have remained pure for the last five months.

In another series of experiments the author tried to make use of the fact that aniline dyes, which exert marked sterilizing action on bacteria even in dilutions of 1 : 5,000 and 1 : 10,000, seem not to inhibit the growth of certain spirochaetes in much greater concentrations. The experiments in this direction are not yet completed, as so far the author has been unable to find a dye which would uniformly inhibit the growth of all the bacteria occurring in contaminated syphilitic material, in a concentration that would allow the life of all the different strains of spirochaetes.

E. H.

LAUNOY (L.) & LÉVY-BRUHL (M.). **Sur la résistance des poules à l'infection par le *Spirochaeta gallinarum* après thyroïdectomie ou splénectomie.**—*Ann. Inst. Pasteur.* 1915. May. Vol. 29. No. 5. pp. 213-220.

The authors' conclusions are as follows :—

(1) The previous removal of the thyroid glands or spleen in an adult fowl does not diminish resistance to spirochaetal infection neither the production of immunity.

(2) The course of the disease is not appreciably affected in fowls that have had their thyroids removed.

(3) In splenectomised fowls, the septicaemia was appreciably more intense than in controls; on the contrary, the clinical aspect of the disease is much more benign and the symptoms of intoxication very slight.

E. H.

FANTHAM (H. B.). **A Note on the Methods of Investigating the Biology of Spirochaetes.**—*Amer. Jl. Trop. Dis. & Prevent Med.* 1915. May. Vol. 2. No. 11. pp. 715-716.

An answer to an article by WOLBACH [see above, p. 216.] in which certain statements made by Fantham in his paper on "The granule Phase of Spirochaetes" had been criticised.

E. H.



## KALA AZAR.

**MACKIE (F. Percival). Insects and Kala Azar.**—*Indian Jl. Med. Res.* 1915. Apr. Vol. 2. No. 4. pp. 942-949.

The author records in this paper the results of a long series of experiments made by him with various arthropods and leeches in connection with the spread of kala azar.

Body lice, head lice, and bed bugs were taken from the bodies or bed coverings of cases of undoubted kala azar. Numbers of these were dissected for microscopic examination while the contents of others were injected into monkeys. The results were all negative. The number of these examinations was as follows :—

Body Lice.—Microscopic Examination	..	1,172
Animal Experiment	..	856
Head Lice.—Microscopic Examination	..	1,170
Animal Experiment	..	1,130
Bed Bugs. —Microscopic Examination	..	1,512
Animal Experiment	..	815

A number of bed bugs bred from the egg in the laboratory were fed on cases of kala azar. Of such 322 were dissected and examined microscopically. In only two did the author find recognizable leishmania, to the extent of two in each bug. The contents of 588 bugs were injected into two monkeys which did not become infected.

Similar experiments (284 dissections and 284 injections into a monkey) were made with mosquitoes which had recently fed taken from the mosquito nets of kala azar patients. The results here were again quite negative.

In the examination of 384 sand-flies (*Phlebotomus*) from the neighbourhood of kala azar cases it was found that a certain number harboured a herpetomonas [see this *Bulletin*, Vol. 5, p. 282], some a Bodo-like parasite and others a Sporozoon-like parasite which occurred in the form of capsulated hyaline oval bodies which were often partially encysted in groups.

Sixty-nine leeches were allowed to feed once on patients whose blood contained *Leishmania donovani*. They were dissected from one to two months after the feed but nothing was found.

The author remarks that this long series of negative results rather tends to check enthusiasm for the insect-borne hypothesis of kala azar, but in view of the many fallacies and difficulties which surround an investigation of this sort it cannot be looked upon as anything but an introduction to a subject which demands an infinite amount of further investigation.

C. M. Wenyon.

**MACKIE (F. Percival). The Experimental Transmission of Indian Kala-Azar to Animals.**—*Indian Jl. Med. Res.* 1915. Apr. Vol. 2. No. 4. pp. 934-941.

This paper contains the details of a large number of experiments conducted with a view to determining the susceptibility of various

animals to the virus of kala azar in Assam. The following are the author's conclusions :—

"1. Monkeys (*Macacus rhesus*), flying foxes (*Pteropus edwardsii*), dogs and white mice were found to be susceptible to the virus of Indian kala-azar when inoculated by the intra-peritoneal route.

"2. The production of the disease in these animals is very uncertain, for though some experiments were successful, a number of others were unsuccessful even when identical doses of the same material were administered to animals of the same species. This means that any attempt to prove the infectivity of suspected material by animal experiment is apt to be fallacious.

"3. Feeding experiments using large quantities of freshly removed and highly infected spleen substance from human subjects, were uniformly negative.

"4. It is noteworthy that young cats, goats and a young pig (animals commonly living in close intimacy with human beings in Assam villages) were able to resist enormous doses of very virulent material by intra-peritoneal inoculation. These animals, therefore, may be considered naturally immune.

"5. The microscopical examination of the spleen and bone marrow of over one hundred dogs, selected from kala azar villages, has not revealed the presence of *Leishmania* in any of them.

The bone-marrow of twenty-five of these same dogs was inoculated into monkeys and bats without result.

"6. The question of the possible infectivity of the faeces of kala azar patients received considerable attention for over a year. The intestinal mucus of many patients in various stages of the disease was administered orally to five monkeys and three dogs, but these animals did not develop kala azar.

"7. The intestinal contents of 3,673 verminous insects caught on kala-azar patients were subcutaneously inoculated into eight monkeys, but none of these developed kala-azar.

"8. Material obtained from cutaneous ulcers, occurring in kala-azar infected areas, has not proved to be infective to animals, nor were *Leishmania* discovered microscopically in such ulcers.

"9. The experiments detailed in this paper do not support the belief that any of the animals referred to are natural "reservoirs" of the virus of kala azar in Assam villages. The most that can be said is that young dogs are more susceptible to experimental infection than any of the other animals which were used."

C. M. W.

ROGERS (Leonard) & SHORTEN (A. J.). **The Alkalinity of the Blood in Kala-Azar and Cholera, and the Technique of its Estimation.**—*Indian Jl. Med. Res.* 1915. Apr. Vol. 2. No. 4. pp. 867-881. With 1 text-fig.

In this paper the technique employed by the writers for the determination of the alkalinity of the blood is described at some length and those intending to follow the method must consult the original description. The blood was tested in seventeen cases of kala azar, which are arranged in a table in accordance with the progress of the patient. It results that with the exception of complicated cases and those staying in hospital only a few days all the kala azar patients who got worse or showed no improvement presented a marked reduction in the alkalinity of the blood, which was greatest in those who progressively deteriorated in spite of every care in hospital.

It must also be noted that the disease progressed in spite of the fact that the alkalinity of the blood had been temporarily raised by treatment directed towards this end. In five cases which showed either

marked improvement or cure, as evidenced not only by general improvement in health but also by the failure to find parasites in the spleen after repeated punctures, the alkalinity was either high or only slightly reduced—a fact which clearly demonstrates the importance of the reduction of the alkalinity of the blood as a factor in the fatality of this dread disease. There does not seem to be any definite correlation between the degree of anaemia and the diminished alkalinity of the blood, though with the degree of leucopenia a more definite relation can be traced.

[On the subject of the alkalinity of the blood in kala azar it is of interest to recall the observations of Capt. R. G. ARCHIBALD, which the author fails to mention in his paper. This observer studied the subject under discussion in four cases of undoubted kala azar in the Sudan and noted that the alkalinity of the blood was diminished and suggested that a line of treatment should be adopted with a view to increasing this alkalinity. The results obtained by Rogers appears to agree with those of ARCHIBALD in the Sudan in 1910 (*Jl. R. Army Med. Corps*, 1910, Vol. 14, pp. 615-620).]

C. M. W.

GIUGNI (Francesco) & BENONI (Francesco). *Sul comportamento in vitro delle Leishmanie col Melltense, coi Germi tifici, para-tifci, e coi loro sieri agglutinanti. La contemporanea infezione di febbre mediterranea e Leishm. int<sup>a</sup>.* [The Behaviour *in vitro* of Leishmania with the Organisms of Undulant Fever, Typhoid and Paratyphoid and their Agglutinating Serums.]—*Malaria e Malat. d. Paesi Caldi*. 1915. Mar.-Apr. Vol. 6. No. 2. pp. 89-94.

The authors have investigated the effect of inoculating cultures of *Leishmania tropica*, *L. infantum*, *L. donovani* and *L. canis* of various origins with different bacteria. Those employed were Eberth's bacillus, bacillus paratyphoid A and paratyphoid B and the *Micrococcus melitensis*. The cultures of the leishmania quickly died off, if they had already developed, when inoculated with the bacteria or they did not develop if the tubes were inoculated with the bacteria and leishmania at the same time. The *Micrococcus melitensis* was, however, an exception, for with it the culture of leishmania developed for about a week before showing signs of degeneration.

Another series of experiments was conducted with a view to testing the influence of the various sera which agglutinated the bacteria used. It was found that the active sera did not differ in their action on the leishmania from ordinary inactive sera.

As a result of these experiments it is noted that the cultures of leishmania survive only with the *Micrococcus melitensis*, a laboratory result which agrees with the clinical finding that the two diseases, infantile kala azar and undulant fever, may be concomitant.

C. M. W.

ROGERS (Leonard). *Further Work on the Treatment of Kala-Azar, with Special Reference to Leucocyte increasing Methods, Spleen Tabloids and Alkalies.*—*Indian Med. Gaz.* 1915. May. Vol. 50. No. 5. pp. 163-170. With 4 charts.

The paper contains an account of various methods of treatment of kala azar practised by the author during the past fifteen years. There

are three main facts which are regarded as of greatest importance in indicating the most promising lines of treatment in kala azar. Firstly, it is quite exceptional for the patient to die directly from the fever which is such a striking and obstinate feature of the disease; he succumbs generally to a secondary infection. Secondly, the prognosis is bad in direct proportion to the reduction in the polynuclear leucocytes in the blood; and thirdly, spontaneous, complete and permanent recovery occasionally follows such infections as cancrum oris and pneumonia provided they produce a considerable increase in the greatly reduced leucocytes. Arsenic as a remedy has very little permanent action though it is of some value for the anaemia. Iodine intravenously in solution in distilled water and potassium iodide and of the strength of tincture of iodine was injected in a dose of three minims, increasing to seven or eight, at two days' intervals. This produced no change either in the clinical features of the disease or its parasite. Sodium nucleate was injected subcutaneously with a view to increasing the leucocytes. The author says of this treatment that it must be classed with the many other failures he has experienced in his many years' search for a satisfactory treatment. In view of the remarkable recoveries sometimes following septic infection, the preparation Phylacogen made of mixed bacterial toxins was tried, but though the reaction was often severe it was a complete failure.

Turpentine injection with the object of increasing the leucocytes is extremely painful and was without favourable results. Dead staphylococcus vaccine had the property of increasing the leucocytes and bringing about some improvement in the condition of the patient, an improvement which unfortunately was too often of a temporary nature. The use of living sensitised staphylococcus vaccine was no improvement and was not without danger. The author now employs a staphylococcus vaccine which has been sensitised and killed either by heating to 60° C. or by adding half per cent. carbolic acid. Spleen substance tabloids have done no harm but failed to produce any improvement. Intravenous injections of sodium bicarbonate, with the object of testing if a sudden increase in the alkalinity of the blood would have any effect on the temperature, were tried. There was in two cases an immediate decline in the temperature which, however, began to rise again after eight and two days respectively. Steady administration of alkalis by the mouth was tried. The results are clearly better than those obtained by any other line of treatment dealt with in the paper. Most of the cases which were not in a very advanced stage when the treatment was undertaken did well and in some the improvement following the treatment was very remarkable. It cannot, however, be considered a specific treatment of the disease but has the advantage of being readily combined with the other beneficial measures, such as the subcutaneous injection of dead sensitised staphylococcus vaccine and the exhibition of spleen or bone marrow tabloids.

C. M. W.

ROGERS (Leonard). **Tartar Emetic in Kala-Azar.** (Correspondence.)  
—*Brit. Med. Jl.* 1915. July 31. p. 197.

The writer of this letter has just seen the paper on the treatment of kala azar by Di CRISTINA and CARONIA [see this *Bulletin*, Vol. 5, p. 269]

by means of intravenous injections of tartar emetic. He wishes it to be known that quite independently of these workers and even without knowledge that GASPAR VIANNA had success with this mode of treatment in the cutaneous leishmaniasis of South America he himself had arranged to treat kala azar cases in this way so far back as October, 1914. It was only six months later he had an opportunity of doing this and he has now treated ten cases and has noted in several of them marked and rapid decline of temperature, together with some gain in weight, diminution in the size of the spleen, increase in the number of leucocytes and decrease in the number of parasites found on spleen puncture—all of which are most promising signs.

He concludes his letter by claiming to have originated the intravenous use of tartar emetic in kala azar quite independently of any other worker and to have obtained a considerable degree of success with it before any other results came to his knowledge. [A notice of GASPAR VIANNA's treatment of American Cutaneous Leishmaniasis by means of tartar emetic appeared in this *Bulletin*, February 14th, 1914. It is to this observer that the credit of first employing the drug intravenously in leishmaniasis is due, and to Di CRISTINA and CARONIA for using it in kala azar with success must be given the credit of priority, even though the possibility of employing the drug in kala azar had previously been in the minds of most people having any knowledge of the disease.]

C. M. W.

CASTELLANI (Aldo). **Brief Note on the Treatment of a Case of Kala-Azar.**—*Jl. Trop. Med. & Hyg.* 1915. May 15. Vol. 18. No. 10. pp. 112-113; *Pediatrics*. 1915. Apr. Vol. 23. No. 4. pp. 241-243.

The author commences his paper by saying that he has given (elsewhere) the results of the treatment of cases of yaws by using tartar emetic, sodium salicylate, sodium bicarbonate and potassium iodide and that it may be of interest to give here the results of the treatment of a case of kala azar by using a similar line of treatment. The patient, an Indian coolie, who was very weak, was diagnosed as a case of kala azar by spleen puncture, numerous leishmania being discovered. He had been in Ceylon three months but had probably contracted the disease in India. He was treated with the author's so-called yaws mixture by the mouth, by intravenous injections of solutions of tartar emetic and liq. Fowleri, and by intravenous injections of solutions of tartar emetic alone.

The yaws mixture contains tartar emetic gr. i, sodii salicyl. 5-10 gr., pot. iod. 1 dr., sodii bicarb. 15 gr. to 1 oz. water. The mixture is pharmacologically very inelegant owing to the bicarbonate of soda but this decreases the emetic properties of the mixture. In yaws patients three doses (1 oz. each) are given daily diluted in four times as much water for adults; half doses to children aged 8-14 years and one-third doses to younger children. The treatment is continued for ten to twenty days. The kala azar patient had three doses daily on alternate weeks for about two months but the pot. iod. had to be reduced to 15 grains per dose.

The solution of tartar emetic and liq. Fowleri was made up of tartar emetic 30 gr., liq. Fowleri 100 minims, aq. dist. 100 cc. One

or two cc. diluted to 4 or 5 cc. with distilled water was injected intravenously twice a week for nearly three months. The tartar emetic alone was used in a 2 per cent. solution, the dose given being 2-10 cg. The patient was treated with these injections during the last two months but as he came irregularly he received one only about every 10th day.

A second spleen puncture was performed four months after treatment was started. Leishmania were still present but "apparently in distinctly smaller numbers."

The patient, who was treated as an out-patient after the first few weeks, finally ceased to attend as he considered himself cured.

C. M. W.

**SARKAR (Sarasi Lal). The Action of Quinine and Arsenical Preparations in Kala-Azar.**—*Indian Med. Gaz.* 1915. Mar. Vol. 50. No. 3. pp. 92-94.

The author quotes certain experiments conducted with a view to testing the effect of prolonged immersion of *Paramecium caudatum* in dilute quinine solutions. It was found that this protozoon was killed in about 20 minutes by a solution of quinine 1 in 25,000. If, however, the protozoa had previously been kept for 24-48 hours in a 1 in 100,000 solution they were killed much more quickly by the stronger solution. That is to say the dilute solution had considerably reduced their resisting powers.

The author believes the beneficial action of quinine injections in kala azar is due to the exposure of the parasites continually to very minute quantities of quinine absorbed from the site of inoculation.

The action of such drugs as atoxyl on trypanosomes in the body is due to a reduction product of atoxyl rather than to the atoxyl itself. Sometimes the atoxyl injected proves very toxic to the host and this is probably to be explained by the production very rapidly of a large quantity of this product of reduction. A case of kala azar treated by the author illustrates this point. The patient received  $\frac{1}{2}$  grain injections of soamin on alternate days. After three or four of these he showed symptoms of arsenical poisoning which was treated by the author by injections of staphylococcus vaccine by way of experiment. The patient recovered from the poisoning and has now remained well for two years. The author supposes that an extra quantity of reduction bodies was produced in this case and that it tended to poison the patient but actually killed the parasites of kala azar.

C. M. W.

**LAFONT (A.) & HECKENROTH (F.). Un Cas de leishmaniose canine à Dakar.**—*Bull. Soc. Path. Exot.* 1915. Apr. Vol. 5. No. 4. pp. 162-164.

At Dakar on the coast of Senegal (lat. 15°) the authors have examined upwards of a hundred dogs for evidence of leishmania infection. Finally they were successful in finding at the end of 1914 a dog suffering from generalized leishmaniasis. The dog was found in the streets of Dakar in an extreme condition of emaciation, mangy and covered with lice and ticks. It died later in the fourriere. At the autopsy the liver

and the spleen were both enlarged and showed on microscopic examination numerous leishmania. The dog's origin could not be traced but there appeared to be no possibility of its having been imported. It was certainly of the native breed with some trace of European blood. The disease, which is presumably the canine kala azar occurring in the districts along the Mediterranean littoral, must have been contracted locally and this is the first instance of its occurrence in West Africa. The presence of the disease in dogs suggests the possibility of the human or infantile malady occurring there also.

C. M. W.

**GIUGNI (Francesco).** Alcuni tentativi di trasmissione della leishmaniosi canina. Andamento clinico e dati necroscopici di un caso di Leishmaniosi nel cane. [Some Attempts to transmit Canine Leishmaniasis, Clinical Course and Necropsy Finding of a Case.]—*Malaria e Malat. d. Paesi Caldi*. 1915. Mar.-Apr. Vol. 6. No. 2. pp. 77-81.

A dog, which was heavily infected with leishmania and in the peripheral blood of which leishmania could constantly be found, was made to live in contact with two puppies from April 4th to June 12th when it died. It was covered with fleas and in order to ensure the passage of fleas from the infected dog to the puppies on four occasions 100 fleas were caught off the dog and transferred to the puppies. The puppies were killed on July 14th. They appeared perfectly healthy and an exhaustive examination of their organs by microscopic examination and by culture failed to reveal any parasites.

The author followed the clinical course of the disease in the infected dog in some detail. There was emaciation, partial loss of hair, and some weakness. The only change noted in the blood was a slight leucocytosis. The temperature taken in the rectum three times a day showed a continued remittent type of fever with very irregular elevations. There was a slight trace of albumin in the urine. Post-mortem the only change noted in the organs was an enlargement of the liver and spleen. An interesting point was that the worm *Spiroptera sanguinolenta* was found encysted in the oesophagus and in the contents of the worm some definite leishmania were discovered.

C. M. W.

**SPAGNOLIO (Giuseppe).** Leishmaniosi canina ed umana e loro presunta dipendenza genetica.—*Malaria e Malat. d. Paesi Caldi*. 1915. May-June. Vol. 6. No. 3. pp. 156-157.

In this note the author draws attention to the fact that in Messina at the present time, owing to the policy of destroying evidently infected dogs, canine kala azar appears to be very much reduced if not entirely absent. In 1910 BASILE reported that as many as 70 per cent. of the dogs were infected. It would be expected, according to the view that canine and infantile kala azar are intimately related to one another, that there would be a similar reduction in the incidence of the disease amongst children. This, however, has not been the case for each year there have been two or three cases. The author considers that this shows that the human and canine diseases are in no way related to one another.

## TROPICAL SORE.

YAKIMOFF (W. L.) & SCHOCKOV (N. F.). *Leishmaniose cutanée (bouton d'Orient)*, au Turkestan russe.—*C. R. Soc. Biol.* 1915. Mar. 19. Vol. 78 No. 5. pp. 107-109.

The mission which was sent to Russian Turkestan to study the human and animal diseases have found that oriental sore is widely distributed. The chief centres of observation have been Boukhara, Samarkand, Askabad and Termèze, the latter on the Russo-Afghanistan frontier. Two types of sore which have been considered by some to be two distinct diseases are in reality one and the same: in both, *Leishmania tropica* has been found. In Turkestan only 58·2 per cent. of the cases which are generally classed as this disease are in reality such; this shows clearly the need of microscopic examination for diagnosis. At Termèze of 59 officers 40 contracted the disease and of these 32 were infected in Termèze itself, 4 at Askabad, 3 at Samarkand and 1 in the Caspian district. Of the 32 infected at Termèze 14 were attacked during the first year of sojourn there, 11 during the second year, 2 during the third, 1 during the fourth and 3 and 1 during the fifth and seventh years respectively. Among 36 soldiers who had the disease in Termèze as many as 29 were infected during the first year of residence.

As regards the time of year at which infection occurs, amongst 48 cases seen in January in 1 the disease had appeared in June, in 7 in July, in 40 in August. Of 28 officers 10 per cent. had the disease appear in June and 45 per cent. in August.

The single sore is most commonly seen but as many as 17 may occur. The duration of the disease is from two months to a year or even two years and a half. As a rule it varies from four to six months. Of 46 cases 38 had the disease only once and 8 twice.

*Leishmania* were never found in the peripheral blood. A lymphocyte increase up to 43 per cent. with a decrease in polynuclears to 46 per cent. was noted. The eosinophiles were frequently 6 per cent.

Work with mosquitos and bed bugs gave only negative results.

It is pointed out that in Turkestan there exist two forms of *Leishmania tropica*. These are:—

1. Large parasites mostly spherical but rarely elongated. The cytoplasm is very liquid, often vacuolated, and colouring a pale blue; the nucleus stains faintly red; it is not compact and consists of isolated granules; it is usually round or oval. The blepharoplast, in the form of a rod, arc or dot, colours deeply; its position in reference to the nucleus varies. The maximum dimensions of these large parasites are 5·42 by 3·92 $\mu$ ; the nucleus 2·74 $\mu$  in diameter and the blepharoplast not less than 0·39 $\mu$ .

2. Small parasites having generally the form of a grain of rice but being sometimes round or oval. The cytoplasm is dense and stains a deep blue; sometimes one can note in it small black grains not unlike malarial pigment. The nucleus, round or oval and compact, stains deeply while the blepharoplast is practically always rod-like. The small parasites attain as a maximum 3·92 by 3·15 $\mu$ . The small form which the authors name *Leishmania tropica* var. *min.* is the predominant form at Boukhara, Askabad and Samarkand, the larger form *Leishmania tropica* var. *maj.* at Termèze.



Pus from a sore on the ear of a patient was inoculated into a mouse intraperitoneally. The animal contracted a general leishmania infection.

The treatment adopted in Turkestan is to powder with medicinal methylene blue. By this method good results are obtained, for some of the sores heal at the end of one and a half or two weeks.

A dog was encountered with a sore on the neck and another on the back. Large leishmania  $8\mu$  in diameter and called *L. tropica* var. *canina* were found in them.

C. M. W.

LAVERAN (A.). **Des Lacertiens peuvent-ils être infectés par des Leishmania?**—*Bull. Soc. Path. Exot.* 1915. Mar. Vol. 8. No. 3. pp. 104–109.

The possibility of lizards taking part in the spread of oriental sore is discussed in this interesting note. SERGENT (Ed. and Et.), LEMAIRE and SÉNEVET showed that cultures of a flagellate closely resembling the cultures of leishmania could be obtained by inoculating N.N.N. medium from the organs of the Algerian gecko *Tarentola mauritanica* in 15·7 per cent. of cases. In 14·4 per cent. of cases a culture of a trypanosome (probably *T. platydactyli*) showing crithidial forms was also obtained but these flagellates could easily be distinguished from those of the leishmania type. It was suggested by the authors that the gecko in question might be a reservoir for the virus of oriental sore, especially as the *Phlebotomus minutus africanus* at Biskra fed both on man and the gecko.

HOWLETT in India has shown that the Indian *P. minutus* also feeds on lizards while ROUBAUD has shown the same to be true of other parts of Africa.

CHATTON and BLANC found in the blood of eight geckos from Metlaoui in Tunis small spindle bodies grouped in vacuoles at one end of the red cells; they bear some resemblance to toxoplasma but have in addition to a median nucleus a centrosome or blepharoplast as in leishmania [see this *Bulletin*, Vol. 5, p. 289.]. It is a question whether the cultures obtained from the organs of geckos mentioned above have their origin in the intra-corpuseular bodies of CHATTON and BLANC.

A further point of interest in this connection is the observation of LINDSAY in Paraguay that the travellers who contract cutaneous leishmaniasis in the forest districts attribute their infection to the bites of Ixodidae (*Amblyoma striatum*) and Simuliidae (called locally "mbariques") which have previously fed upon the hissing snakes which have a special attraction for them.

With a view to the elucidation of this problem of a reptilian host for the leishmania the author has made attempts to infect lizards. Two geckos (*Tarentola mauritanica*) were inoculated twice subcutaneously—once with a testicular extract from a mouse very rich in *L. tropica* and once with a culture of the same organism. Another gecko was inoculated on two occasions intraperitoneally with rich cultures of the same parasites. The result was absolutely negative. A further attempt was made to infect four specimens of *Lacerta viridis*, also without success. One *Lacerta viridis* was inoculated intraperitoneally with an extract of the spleen of a dog heavily infected with

*Leishmania infantum*. After 30 days puncture of the peritoneum gave some cells containing leishmania. From the peritoneal fluid, however, no culture could be obtained. Two other lizards gave a completely negative result.

The author points out that though these experiments are somewhat meagre and have need of extension still they lend no support to the view of there being a lizard reservoir for *L. tropica*. In collaboration with FRANCHINI he has shown that certain flagellates of fleas and mosquitos may produce mild infections when injected into animals and it is conceivable that in certain localities, such as the oases of the Sahara, the high temperature or other conditions might lead to an increase in virulence of what are usually harmless insect parasites. The frequency with which Simuliidae and Phlebotomus occur in the oriental sore areas has suggested that these flies may be the vectors of the *Leishmania tropica*. In 1909 GEORGEVITCH\* described a Crithidia from the simulum of Servia while WENYON† in 1912 recorded a herpetomonas in the Phlebotomus of Aleppo, Syria, and later MACKIE one from the *Phlebotomus minutus* in India [see this *Bulletin*, Vol. 5, p. 282.] WENYON and MACKIE both assumed that these were harmless flagellates of the insects in question but the author points out that they may in reality have some connection with the spread of oriental sore. There is scope for further investigations along these lines.

C. M. W.

SERGEANT (Edm.), SERGEANT (Et.), LEMAIRE (G.) & SÉNEVET (G.).  
**Hypothèse sur le phlébotome "transmetteur" et la tarente "réservoir de virus" du bouton d'Orient.**—*Ann. Inst. Past.* 1915. July.  
 Vol. 29. No. 7. pp. 309-322.

This paper is a discussion on the possibility of a species of Phlebotomus being the carrier of the virus of oriental sore and of the lizard (*Tarentola mauritanica*) acting as a reservoir. It is pointed out that in North Africa there are two centres, Biskra and Bon-Anane, where oriental sore is common but that sporadic cases occur throughout North Africa. If Phlebotomus, which is widely distributed in North Africa, is the carrier of the disease then some other factor must explain its much greater frequency at Biskra and Bon-Anane. Either some particular species of Phlebotomus alone is involved or there is some reservoir host which is limited especially to these districts. It appears that the large Phlebotomus belonging to the *papatasi* group feed almost exclusively on man while those of the smaller group—the *minutus* group—feed both on man and reptiles. This being so, it is strongly suggested that some reptile will play the rôle of the reservoir host of the *Leishmania tropica*.

\*GEORGEVITCH (Jivoïn). Sur un trypanosomide nouveau, *Crithidia simuliae*, N. sp. d'une Simulie (*Simulium columbacensis*) de la Serbie septentrionale.—*C. R. Soc. Biol.* 1909. Vol. 67 (2e semestre) pp. 480-482. With 1 text fig.

Sur le Développement de *Crithidia simuliae*, N. sp.—*Ibid.*, pp. 517-519. With 1 text fig.

†WENYON (C. M.). Note on the Occurrence of Herpetomonas in the Phlebotomus of Aleppo.—*Jl. London Sch. Trop. Med.*, 1912. Vol. 1, p. 98.

At Biskra the lizard (*Tarentola mauritanica*) is very common and is fed upon by the small Phlebotomus (*P. minutus* var. *africanus*) of this region. It feeds also upon man but seems to prefer the diet of reptilian blood.

An investigation of the lizards was undertaken, and in 1913 an examination of 319 captured at Biskra was made. A large percentage (44·82) of the lizards harboured haemogregarines. In 5·01 per cent. *Trypanosoma platydictyli* Catouillard, 1909, was found while in 7·34 per cent. there occurred filaria embryos, especially in the lungs. Material from the livers of 219 of these lizards was inoculated on to N.N.N. medium and cultures were obtained in 61 cases—28 times a culture of a leptomonas, 26 times a culture of the trypanosome and 7 times a mixed culture of both these.

In the cultures the leptomonas is shaped like a candle flame and has a rigid body 9–15 $\mu$  in length with a flagellum either shorter or longer than the body from the blunt end of which it arises. In a single culture tube the growth will last for two months, when recognisable forms of the flagellate disappear. The authors compare the cultural forms with the leptomonas found by WENYON in the Phlebotomus of Aleppo. This leptomonas has a body 15–25 $\mu$  in length and is thus larger than the leptomonas cultivated from the liver of the lizards. There is no possibility of confusing the culture of *Trypanosoma platydictyli* with the leptomonas culture, which remains true to type exactly like the culture of *Leishmania tropica*. Experiments have been made by inoculating three men in the skin with cultures of the lizard leptomonas. Monkeys and mice have also been inoculated, the latter either intravenously or intraperitoneally. Control mice were inoculated at the same time with cultures of *L. tropica*. Four months later of 27 mice inoculated with cultures of the lizard leptomonas two showed in the liver or spleen bodies which might possibly be leishmania forms. Culture on N.N.N. medium was negative. Of the control mice inoculated with cultures of *L. tropica* from the Biskra oriental sore 5 had a generalized infection with leishmania. The experiments on the men and monkeys are not yet complete.

By way of controlling the results obtained in the endemic areas the lizards in other districts were examined. At Beni-Ounif-de-Figuig, where oriental sore does not occur, of 203 Phlebotomus caught only one was *P. minutus* var. *africanus*. Of 6 lizards examined culture of leptomonas was obtained from the livers of two.

Reference is made to the parasite found by CHATTON and BLANC in the Gecko (*Tarentola mauritanica*) of Metlaoui (Tunis). These are leishmaniform bodies which occur in the red blood corpuscles. It may be these structures which have given rise to the cultures of leptomonas. Another parasite found by CHATTON and BLANC, a protoplasm-like organism, called by them *Pirhemocyton tarentolae*, occurs in the *Tarentola* of Biskra (11 cases of infection out of 319 examinations) whereas the leishmaniform bodies were not found in the lizards of Biskra.

This line of research was interrupted by the war but the authors hope that more favourable circumstances will see a continuation of the interesting investigation.

C. M. W.

**MEDICAL MISSIONS IN INDIA.** 1915. Apr. Vol. 21. No. 81. pp. 14-17.  
—Symposium : **Oriental Sore.**

The several speakers gave their experiences in the treatment of this disease. In no case was the diagnosis confirmed by the microscopic finding of leishmania. The consensus of opinion was that treatment was best carried out by extensive scraping followed by the application of some antiseptic ointment or lotion. In one case scarlet ointment made from scarlet red (Amido-azotoluol-azo-Beta-naphthol) was recommended.

C. M. W.

**MIGONE (L. E.). i. Buba, or Leishmaniasis americana, in Paraguay.**—*Trans. Soc. Trop. Med. & Hyg.* 1915. June. Vol. 8. No. 7. pp. 219-225.

**ii. Further investigations on the Etiology of Leishmaniasis americana.**—*Loc. cit.* pp. 226-228.

i. During recent years a disease called buba has appeared in the north of Paraguay, among the native workmen in the large industrial establishments of these regions, in the Yerba Maté plantations, and in the lumber forests. The condition is an ulcerating affection of a chronic nature and slow development, which attacks the uncovered parts of the body—the feet, the legs, the arms, neck and face—and later invades the mucous membranes of the nose, pharynx, larynx, palate and lips. This disease has very likely spread to this country from the neighbouring state of Brazil, where it has long been known to exist. It has spread in Paraguay to such an alarming extent that in those districts which are infected hardly a house can be found in which one or several cases of the disease do not exist. The disease has been observed in natives of the country and in foreign residents, in men and in women, in the old and in infants at the breast. In certain districts it has caused terrible havoc. Of one hundred workmen who entered the woods to work, seventy to eighty had to leave within two months owing to the development of ulcers, in many instances in large numbers spread all over the body. The disease, which has been confused with syphilis, leprosy, sporotrichosis, cancer, yaws, etc., is now known to be a leishmaniasis. The disease begins generally with one or more erythematous papules which are very itchy, as if they had been caused by the bite of some insect. Two or three days later one or more of these papules become purulent, the pustule being about the size of a pin's head. When the pustule bursts, as it soon does, it leaves a small hole from which there exudes a sticky, serous fluid which on coagulating forms a dark greyish scab.

It is generally believed that the initial lesion has been caused by ticks but the author states that he has seen sores develop at the site of mosquito or horsefly bites or even at some point of traumatic abrasion of the skin. The ulceration extends while the surrounding skin becomes somewhat oedematous. From the ulcers there originates a lymphangitis, the affected lymphatics forming hard reddish cords and if these are pressed in the direction of the sore there exudes a sero-purulent discharge. Here and there on the affected lymphatics are found hard nodules which later burst and form new ulcers. The

ulcers often heal in seven or eight months. The lymphatic glands are large and painful and after recovery they do not regain their natural size. In five or six months from the original inoculation and the appearance of the primary papule there begin to appear the lesions of the nasal and pharyngeal mucosa. These mucosal lesions may appear two or three months after the cicatrization of some quite insignificant sore on the skin. The whole naso-pharyngeal mucosa becomes involved, the septum is destroyed, while ultimately the outer nose, the skin over the cheek bones and the lips become involved, thickened and replaced by granulating masses which are either moist or dry. Ultimately the isthmus of the fauces gets blocked up while the pharynx and larynx become occluded so that speech and nutrition become impossible. The teeth become attacked with a periostitic infiltration and a secondary alveolitis though in the most advanced cases lesions of the tongue or digestive organs or true osseous lesions are never seen. The patients may live ten, fifteen or twenty years, the infiltration gradually extending to the bronchi until septic fever, malnutrition and exhaustion end in death. Leishmania are always to be found in the lesions though more readily in the early than in the chronic conditions.

Treatment in the early cases is comparatively easy--caustics, thermo-cautery, with potassium iodide and arsenic by the mouth. In advanced cases the treatment is very difficult though extensive cauterisation with the actual cautery and "606" have given good results, but the treatment must be repeated on three or four occasions. When the disease has invaded the mouth and nose it is very intractable. Improvement, however, has followed the use of hectine, "606," orsudan, soamin, etc., but the resulting cure is slow and has to be supplemented by local caustics.

ii. The second paper is chiefly a discussion of a contribution by BRUMPT and PEDROSA on the subject of the most probable carrier of the disease in Brazil. The paper was reviewed in this *Bulletin*, Vol. 3, p. 140.

In a discussion following upon the reading of the papers by Migone Dr. Low points out that no mention is made of injections of antimony tartrate, a line of treatment which several observers in South America have found to yield very encouraging results.

C. M. W.

**LAVERAN (A.). Nouvelle contribution à l'étude des infections expérimentales de la souris par la *Leishmania tropica*.—*Bull. Soc. Path. Exot.* 1915. June. Vol. 8. No. 6. pp. 363-369.**

This paper contains the results of further experiments by the author on the effects of inoculating mice with the parasite of oriental sore. A review of his earlier results will be found in Vol. 4, p. 401 and Vol. 5, p. 277 of this *Bulletin*. In all 36 mice have been inoculated with *Leishmania tropica* of Tunisian origin. In only six instances was the result negative, a fact due in these cases to a late examination, the animals having most probably recovered from an earlier infection. All the infected mice developed localized skin lesions while in the males

there developed tumours of a new growth which enveloped or even invaded the testicles. In only eight instances was the local infection attended by a generalized distribution of the parasites as judged by examination of the spleen, liver and bone marrow and in only one of these could the general infection be described as large. On comparing the enormous numbers of leishmania in the local lesions the impression gained is that the general infection is in reality of a secondary nature and not comparable with that seen in infections with *L. donovani* or *infantum*.

The testicular tumours which appear in the male mice have been examined in section. In one mouse the change was limited to the connective tissue surrounding the organ, which itself appeared normal. The fibrous capsule of the kidney was, however, involved at one point. The change observed was in the form of a deposit of embryonic elements in the connective tissue, which contained large numbers of leishmania. In a second mouse the condition was more pronounced, there being some tendency towards atrophy of the testicular tissue, while one testicle was actually invaded by the new growth deposit. In a third animal the new growth had produced marked degenerative changes in the testicle, due probably to pressure and to an invasion between the tubules of the testicle and also into the capsule of the organ. Leishmania were only to be found in the cells of this new growth and never in the tubule cells.

The animals have a tendency to the development of superficial abscesses and these when opened are found to contain a purulent fluid containing enormous numbers of leishmania. In other cases the abscesses are of a septic nature and bacteria only are to be found in them. In another mouse there was an arthritis due to invasion by the leishmania, for a puncture of a tibio-tarsal joint produced a thick fluid in the smears of which were found leishmania in extraordinary numbers.

The paper contains a detailed history of six mice. The animals were inoculated either intraperitoneally or subcutaneously with cultures of *Leishmania tropica* or parasites obtained from the broken up testicle of a previously infected animal. The mice received as a rule several injections at intervals of a week or more. Some animals were only inoculated once with a virus rich in leishmania. The lesions appear to be well developed after about a month while the animals were killed for examination after two or three months.

As a result of his experiments the author finds that the infection produced by *Leishmania tropica* in mice differs in its results from that produced by *Leishmania donovani* and *Leishmania infantum*. The former gives rise to lesions of the skin and a subsidiary general infection while the latter produces no skin lesions but only the generalized infection as in kala azar.

C. M. W.

GIUGNI (FRANCESCO). **La riproduzione della leishmaniosi cutanea nella scimia da un caso di bottone d'Oriente osservata in Italia.** [The Infection of a Monkey with Cutaneous Leishmaniasis from a Case of Tropical Sore in Italy.]—*Pathologica*. 1915. May 15. Vol. 7. No. 157. pp. 237-238. With 2 figs.

The author describes a case of oriental sore in a girl aged nine years from Reggio Calabria in Italy. A monkey (*Macacus sinicus*) was inoculated from the sore on the child's chin in the left frontal region. It developed an oriental sore at the site of inoculation 67 weeks later though no sore developed on the right side, where it had been inoculated with a culture of *Leishmania tropica* from another case of oriental sore.

C. M. W.

- i. da MATTA (Alfredo A.). **Leishmaniose cavitaria.** [Leishmaniasis of the Buccal Cavity.]—*Brazil Med.* 1915. Mar. 8. Vol. 29. No. 10. pp. 73-74.
- ii. TORRES (Octavio). **O valor do tartaro emetico na leishmaniose. Tres observações.** [The Benefit of Tartar Emetic in Leishmaniasis; Three Cases.]—*Ibid.* Apr. 1. No. 13. pp. 97-101.
- iii. BORJA (Antonio) & AMARAL (Afranio). **Contribuição ao tratamento da Leishmaniose cutanea-mucosa pelas injeções endo-phlebicas de emetico.** [A Contribution to the Treatment of Muco-Cutaneous Leishmaniasis by Intravenous Injections of Tartar Emetic.]—*Arch. Brasil. Med.* 1915. Feb.-Mar. Vol. 5. No. 2-3. pp. 145-154. With 3 plates.

i. A case of leishmaniasis of the right nasal passage in a woman 40 years of age, with the further complication of a similar ulceration in the vulva. The parasite was recognized in smears made from both lesions. Treatment with VIANNA'S tartar emetic solution [see this *Bulletin*, Vol. 5, p. 269] was initiated, but the patient succumbed to an intercurrent thrombosis of the cerebral sinuses.

ii. Three more cases of the same kind, of which one was perfectly cured at the time of writing, while the other two showed marked improvement.

iii. Seven more cases of the same affection similarly treated. The plates give good photographs of the lesions.

J. B. Nias.

## YELLOW FEVER.

**KERR (W. M.).** **An Account of the Yellow Fever which prevailed on board the United States Ship "Jamestown" in 1866-67 at Panama, as told by Delavan Bloodgood, A.M., M.D., Surgeon, United States Navy.**—*U.S. Naval Med. Bull.* 1915. Jan. Vol. 9. No. 1. pp. 82-110.

The writer of this paper has reproduced the account of the outbreak of yellow fever which occurred in the U.S.S. "Jamestown" in 1866-67, which was then acting as hospital and store ship at Panama. The story, as told by Dr. Bloodgood, now reposes in a musty volume of Medical Essays compiled from reports by the medical officers of the navy and published in 1872. It is of much interest and affords a glimpse of the distant days of sailing ships and long voyages, when ventilation, food and water supply and the means of caring for the sick were not of the best when judged by modern standards. Those who wish to realise how different are the conditions now prevailing under modern prophylactic measures can do no better than read the story of this fearful outbreak of yellow fever.

C. M. W.

**PALACIOS (G. Delgado).** **Why Yellow Fever is Endemic in the Tropical and Atlantic Region.**—*Med. Rec.* 1914. July 25. Vol. 86. No. 4. pp. 150-152.

Reference is made by the author to his earlier researches on a substance—cholerythrogen—which he has found to occur in the intestines and urine of people living in tropical and Atlantic regions where yellow fever is endemic. This substance associates itself with the urobilinogen and lime to form granular concretions similar to the ordinary intestinal sand which the author calls carcoma on account of its resemblance to the dust made by the wood-louse. The substance cholerythrogen appears to replace the uroerythrin of the temperate zones. The author further states that this substance is deposited in granules in the kidney, liver and spleen of cases of yellow fever—granules which have hitherto been supposed to be of the nature of melanin but which he has proved by a series of tests to be true cholerythrogen. "Therefore," to use the author's own words, "the assistance of a substance of intestinal origin in the production of yellow fever in its most dreadful manifestations must be considered as an established fact." The substance appears to be formed in the intestine by the action of specific bacteria which grow in the tropical and Atlantic region.

In the case of yellow fever it is not possible to establish what relation exists between the climatic substance of bacterial origin and *Stegomyia fasciata* but "the fact that this mosquito grows near human habitations and the observation of Reed, whose success was greatest when he added faecal matter to his breeding jars, are very suggestive."

C. M. W.



SEIDELIN (Harald). **Notes on the Pathology of Yellow Fever in Guinea-pigs.**—*Jl. Path. & Bact.* 1915. Jan. Vol. 19. No. 3. pp. 317–320. With 2 plates.

The author has made a detailed study of the histological changes undergone by the organs of guinea-pigs supposed to be suffering from yellow fever, some of which were infected by inoculation of blood, others by means of infected mosquitoes. The spleen, which is not enlarged, shows marked erythrophagocytosis and more or less intense pigmentation. One and the same phagocyte often contains erythrocytes, fragments of red cells and pigment. The author thinks that the lesions here described may be of importance for a better understanding of the pathology of yellow fever. Thus the erythrophagocytosis and destruction of haemoglobin in the spleen and to a slight extent in the liver may assist us in explaining the jaundice.

In yellow fever in the human subject necrobiosis is probably the most important phenomenon observed in the liver. ROCHA LIMA (1912) has described a midzonal necrosis as characteristic of yellow fever, but the author considers that the observation cannot be accepted as final as he has not found it of constant occurrence, while ORIE and OGATA have noted it in other cases of septic icterus. In the experimental animals the necrobiotic phenomena are most marked in the middle zones of the lobule, although on the whole they must be classified as focal rather than zonal.

The gastric, pancreatic and renal lesions are similar to those observed in human cases though less marked. Those who are interested in the subject of the histo-pathology of yellow fever in the guinea-pig must consult the original article for further details.

C. M. W.

SEIDELIN (Harald). **Division Forms of Parasites in the Organs of Guinea-pigs Infected with *Paraplasma flavigenum*.**—*Jl. Path. & Bact.* 1915. Jan. Vol. 19. No. 3. pp. 338–340. With 1 plate.

The author describes certain elements which have been observed in impression-specimens from the spleen, liver, kidney and lung of guinea-pigs which had been inoculated with yellow fever virus. These division forms of *Paraplasma flavigenum*, for such is the author's interpretation of their nature are, to begin with, intracorpuseular and the early stages may occur in the peripheral blood though always in small numbers. The earliest division form is larger than the ordinary peripheral blood form and has a more compact protoplasm. It leaves the erythrocyte but before doing so its chromatin may divide into two or four particles. In the following stage eight more or less definite elements appear, which are either irregularly ovoid, pyriform, or even vermicular, each one consisting of chromatin and protoplasm. Further division results in the formation of sixteen or more elements, the extreme minuteness of the objects now making it impossible to determine their exact number.

The possibility of their relationship to the *Pneumocystis carini* or lung parasite of the guinea-pig is discussed and the author admits the possibility of a mixed infection, though the presence of the bodies in other organs than the lung, their occurrence in a monkey inoculated

with blood containing *Paraplasma flavigenum*, and in specimens from yellow fever cases in man is distinctly against this view. In appearance they have the characters of Koch's "blue-bodies," the division forms of *Theileria parva*.

The author assumes that they represent a stage in the evolution of *Paraplasma flavigenum*—a form of multiplication which differs from the ordinary type of multiplication to be found in the erythrocytes of the peripheral blood. The author quotes Dr. Andrew CONNALL as being in agreement with him as to the nature of the bodies which form the subject of the paper. It is perhaps worthy of note that some of the guinea-pigs were infected by direct inoculation of the blood while others were infected by the bites of infected mosquitos.

[The author's interpretation of the appearances described above depends entirely on the views adopted as to the nature—parasitic or otherwise—of the bodies described by him as *Paraplasma flavigenum*.]

C. M. W.

SEIDELIN (Harald). **Intracorpuseular Bodies in Guinea-Pigs' Blood and Yellow Fever.**—*Jl. Trop. Med. & Hyg.* 1915. Feb. 15. Vol. 18. No. 4. pp 38-40.

WENYON (C. M.) & Low (George C.). **The So-called Parasite of Yellow Fever.**—*Jl. Trop. Med. & Hyg.* 1915. Mar. 1. Vol. 18. No. 5. pp. 55-56.

These two communications call for no review as they contribute little to our knowledge of the subject under dispute. The former is a criticism of the paper noted in this *Bulletin*, Vol. 5, pp. 79-80, and the latter a reply to this criticism.

C. M. W.

## BOOK REVIEWS.

**BRAZIL (Vital). La Défense contre l'Ophidisme.** (Traduction française par le Professeur J. MAIBON.)—2ème Edition. 319 pp. With 28 plates. 1914. Saint Paul: Imprimerie Pocaï-Weiss & C. Rua João Adolfo 60.

Although in this book the venomous snakes of the one country Brazil are the main theme, and the exposition of the nature of their venoms and antidotal sera alone is the chief purpose, yet the scientific and historic perspective are so well observed that the issue has an interest and a utility that are much more than local.

The subject is dealt with in three sections, of which the first treats of snakes and snake-venoms from a biological and physiological standpoint, the second discusses with some prolixity methods of preventing accidents from snakes, and the third is concerned both indirectly and directly with the treatment of snake-bite.

The first section embraces the natural history of the subject—the external features, dentition, anatomical characters, reproduction, habits, and classification of snakes. This is followed by an account of the *Colubridae* and *Viperidae* of Brazil, beginning with a brief notice of the harmless Colubrids, in which attention is chiefly directed, both by text and coloured figures, to those presumably useful species that feed upon their own kind, and to those that look like venomous species. Then the venomous snakes of the country are reviewed in detail, these numbering twelve species of *Elaps*—the only genus of venomous Colubrids occurring in America—and the same number of species of loreal-pit-vipers (*Crotalinæ*), which are the only American representatives of the *Viperidae*. It is to these latter, which in Brazil comprise a single species of *Crotalus* and eleven species of *Lachesis*, that the author devotes most attention; all the commoner and more formidable species are fully described under their scientific and vernacular names, and are well figured in colour; their habits, haunts, and local distribution are advertised; and the obvious effects of their bites are impressively illustrated by authenticated tragedies.

In the author's experience the most dangerous of all Brazilian snakes is a Rattlesnake, *Crotalus terrificus*, which is very abundant in many parts of the country. Its venom is stated to be peculiar in having a selective affinity for the nervous system, and further in becoming to some extent provisionally locked-up in the blood of a victim, so that several days after the administration of appropriate antivenine has apparently ensured complete recovery this latent venom is suddenly released and causes a startling relapse; for this reason it is advised that any patient bitten by this snake should be kept under observation for 15 to 20 days after the initial treatment.

Other species at once common and dangerous are *Lachesis mutus* ("Surucucu,") *Lachesis lanceolatus* and *atrox* ("Jararaca," "Jararacuçu,") *Lachesis alternatus* ("Urutu," "Cotiara," "Cruzeiro,") and *Lachesis jararacucu*, which the author considers to be distinct from *L. lanceolatus*.

After a comprehensive account of the reptiles themselves, the chemical characters and the physiological and pathological effects of their venom are considered in detail. The historic observations and generalizations of workers in other countries are pertinently discussed, but the most valuable contribution is the author's own disquisition, systematic and comparative, upon the venoms of the Brazilian species. These venoms he groups in three series, namely (1) Elapine, causing marked paralysis, but little local reaction; (2) Crotalic, causing moderate local reaction, marked paralysis, and extraordinary visual disturbance; and (3) Bothropic (*Lachesis* venoms) causing intense local reaction and great haemolysis and proteolysis, but having no action upon the nervous system; another feature of *Lachesis* venoms is that doses below minimum lethal standard have very little toxic effect.

If the second section, entitled Prophylaxis, may seem unduly formal, its justification may perhaps be found in the author's estimate that annually in Brazil nearly 20,000 accidents and nearly 5,000 deaths are due to venomous snakes. The facts that 60 per cent. of the bites are on the foot

and 13 per cent. on the leg are evidence that in Brazil, as in India, the lack of foot-gear and of money to buy it is the main impediment to security. The author enumerates all the natural enemies of snakes, and holds in very high regard the "Mussurana," *Oxyrhopus cloelia*, a harmless Colubrine, which is said to feed exclusively on other snakes and to be addicted particularly to the venomous kinds, overcoming and swallowing them in a most heroic manner.

In the third section among other matters the methods of preparing antivenines at the Institute of San Paulo are fully described. The animals used are horses and he-mules, and the usual process of immunisation extends over a year. For procuring comprehensive immunity mixtures of different venoms are employed, standardized glycerine solutions of the clarified and dried secretion of the several commoner species forming the exact components of the mixtures. Four kinds of antivenines are issued from the Institute, namely, "anti-elapine," which is antitoxic to a mixture of the venoms of the different species of *Elaps*; "antiophidic," antitoxic to a mixture of the venoms of *Crotalus* and all the common species of *Lachesis*; "antibothropic," antitoxic to a mixture of *Lachesis* venoms alone; and "anticrotalic," antitoxic to *Crotalus* venom alone.

The whole range of treatment of snake-bite is also surveyed, from the sorcerer and the quack to serum-therapy. Surgical treatment and the use of the salts of manganese and of other chemical reagents are discussed, but not with much appreciation, the experimental work of Captains ACTON and KNOWLES of the Indian Medical Service, which establishes the value under certain conditions both of ligature and of the injection of salts of manganese, having, no doubt, been published too recently for consideration in this edition. BANNERMAN's opinion, which the author quotes with approval, that the local injection of potassium permanganate is useless, does not justify the disavowal of every kind of treatment outside the line of antitoxins; for the careful and properly controlled experiments of ACTON and KNOWLES show that an immediate local injection of 10 cc. of a 5 per cent. solution of zinc permanganate, or of gold chloride, alone may save a number of cases of cobra-bite, and still more of Russell's-viper-bite; and further, that the immediate application of an efficient ligature has saved life, in cases of Russell's-viper-bite, without other treatment. And in any case, even when a suitable antivenine is available, both measures are likely to diminish the amount of absorbed venom that has to be neutralised.

The worth of this valuable treatise is much enhanced by a bibliography, from which however some well known names and several classical references are missing. The names of BEAUJAN, D. D. CUNNINGHAM, and GUNN do not appear, and the references to the work of FRASER, NOGUCHI and WEIR MITCHELL are quite inadequate.

A. Alcock.

BAHR (P. H.). [M.A., M.D., D.T.M. & H. (Cantab.), M.R.C.P. (Lond.), M.R.C.S.] **A Report on Researches on Sprue in Ceylon 1912-1914.**—ix + 155 pp. With 8 plates. 1915. Cambridge: At the University Press. [Price 7s. 6d. net.]

Of tropical diseases there is hardly any one of which we are more ignorant of its true pathology than sprue, and therefore the Committee of the London School of Tropical Medicine eagerly embraced the opportunity when it offered of sending Dr. Bahr to Ceylon to investigate it. He spent some fifteen months of 1912-1913 in that island of many climates, and wisely installed his laboratory in the hill resort of Nuwara Eliya, where the cooler air permits an European to work at any time of the year. From the laboratory it was easy to descend by bicycle or train to visit cases of the disease or to perform autopsies. In this way much valuable material was collected, which was then worked out in London at the Tropical School.

The monograph begins with a short account of the island and the prominent types of its people. The Europeans, who number some 7,500, suffer chiefly from typhoid fever, amoebic dysentery, malaria and sprue. All the races represented in Ceylon are liable to sprue, but the imported European is specially susceptible. On the other hand, the author is convinced that the disease is of more common occurrence in native races than has hitherto been supposed by English observers. He saw eleven undoubted cases among native males, and 36 cases among Europeans, five of whom had always lived in Ceylon. Of the European patients, 19 were females and 17 were males, and additional proof that, among Europeans at least, women are specially susceptible, for there are twice as many European males as females in Ceylon. Though in five experiments on monkeys and guinea-pigs he failed to communicate the disease, the author is strongly of opinion that sprue is communicable in the family, and he quotes seven cases of apparent infection, which came under his own notice. Defining as complete sprue all cases with the characteristic tongue and faeces, he suggests that there are many clinical cases of two varieties of incomplete sprue, (1) where typical diarrhoea exists, but no tongue or mouth lesions, (2) where the changes are confined to the mouth and tongue. This last variety he calls "tongue sprue." If he is correct, and if flatulent dyspepsia, large, pale, frothy, acid stools and oesophageal irritation are no longer to be considered pathognomonic symptoms, it is clear that we must re-construct the definition of the disease.

After almost daily examination of the faeces of four patients during more than two months, he is of opinion that the loss of colour in sprue stools is due, not to absence of bile pigment, but to the reduction of the normal hydrobilirubin to the colourless leucourobilin. The average weight of a daily sprue stool varied from 56 to 901 grammes, while evidence showed that there was a diminution or absence of the pancreatic ferments. In every sprue patient examined, and especially in those in whom tongue symptoms predominated, the saliva presented a marked acid reaction to litmus paper. He could not discover any essential difference between the microscopical structure of the sprue tongue and that of an infant's tongue affected by the thrush fungus. He inclines to the view that the pathology points to an infection with the thrush fungus, *Monilia (Oidium) albicans*, as the cause of sprue. In six sprue spleens he found hyaline, Gram-positive, not acid-fast bodies in the endothelial cells, and he failed to find these bodies in 43 spleens where the cause of death was dysentery, ankylostomiasis, undetermined diarrhoea, malaria, kala azar, pernicious anaemia, tuberculosis, etc. He suggests that these new bodies are possibly a degeneration produced in response to the extensive yeast infection, but he modestly acknowledges that it is as yet unproven whether the bodies represent a degeneration pathognomonic of sprue. In acute sprue and in the final stages of the disease the most prevalent organisms in scrapings from the tongue, in saliva and in stools are yeast colonies of which the author examined 112 cultures obtained in Ceylon; all but six of these belonged to the genus *Monilia*.

There is nothing new in the treatment advocated, except that bael fruit (*Aegle marmelos*) is highly praised, especially when given raw. Three cases of sprue diarrhoea were empirically treated for a time with emetine injections, but without avail.

To this useful monograph are appended a list of references, interesting details of cases and some excellent water colour sketches, for the author has the great advantage of being an artist.

F. M. Sandwith.

## TROPICAL DISEASES BUREAU.

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## APPLIED HYGIENE IN THE TROPICS.

By COLONEL W. G. KING, C.I.E., I.M.S. (Retired).

## REPORTS.

## BRITISH GUIANA (1913-14).\*

The Report of the Surgeon General for 1913-14 shows that the total population of British Guiana gained during the year an increment of 5,000, making the total 303,984.

The birth-rates have shown an increase, the death-rates a decrease, as follows :—

<i>Year.</i>				<i>Birth-rate.</i>	<i>Death-rate.</i>
1911	..	..	..	28·8 per mille	31·7
1912	..	..	..	33·1	29·2
1913	..	..	..	34·6 „ „	24·2

From 1907 to 1911, there was unusual rainfall ; in 1912, drought occurred. The Surgeon General suggests that the latter condition has aided the attainment of improved death statistics. Malarial fevers, ankylostomiasis and syphilis are the chief causes of absence of resistance to acute diseases. No epidemics occurred during the year. Yellow fever has not exhibited itself since 1883, and plague and cholera are unknown.

In his Report for 1912-13, the Surgeon General found good ground for pessimism in regard to the sanitary condition of Georgetown. He then stated : “ Were it not for matter of sanitation effected by the breeze and sun, Georgetown would be as hideous as some of the cities of the Middle Ages when affected with plague.” He is now able to state that the Mayor and Council of Georgetown have established “ a special sanitary department supervised by a whole time Medical Officer of Health and strengthened by the appointment of a Chief Sanitary Inspector with English training and experience,” and that these new arrangements “ have more than ample justification for the special expenditure.” Only once before in twenty years (1901) has

\* Report of the Surgeon General for the Year 1913-1914. [Surgeon-General K. S. WISE]. 112 pp. 1914. Georgetown, Demerara : The Argosy Co., Ltd.

the birth-rate (30·6 per mille) exceeded the death-rate (26·5 per mille) for 1913-14. He regards this as "eloquent testimony to the value of the service rendered by Dr. Wishart," the whole time Medical Officer of Health. He is further able to state that the town of New Amsterdam "has made efforts to meet the demands for sanitation by the appointment of two Sanitary Inspectors."

The fact, however, remains that there is much to be done in Georgetown, before it can no longer be regarded as a peril to the rest of the Colony. In 1913-14, 254 notifications of typhoid fever were received in Georgetown, plus 10 in its environs. In the whole Colony, the average deaths per annum from this disease between 1886-1890 were 6·6; by 1906-1910, the annual average was 27·6. Since the latter period, the annual deaths have been in 1911, 76, in 1912, 93, in 1913, 106. The moral drawn by the Surgeon General is, "the City of Georgetown is the home of this disease, and the more persons infected the more carriers will exist, and the further over the Colony will the disease spread."

As to New Amsterdam, the hopeful statement is made: "The town is favourably situated, well laid out and not overcrowded. With comparatively little expenditure and attention it might well be a model for tropical towns." Evidently, the Surgeon General believes it is cheaper in human life and funds to require a town "in the making" to enforce sanitary requirements than in after years to attempt amelioration of conditions arising from their having been ignored.

In the forest hinterland and in the savannah, lies the future wealth of British Guiana, and it is therefore satisfactory to find it emphatically stated:—

"The recent large expedition which accompanied His Excellency the Governor on a journey of two months through the forest regions to the southern savannahs, has shown that the adoption of suitable precautions renders travelling in the hinterland forest areas almost devoid of danger. . . . The savannah land, though but a degree or two from the Equator, is remarkably healthy and probably the healthiest part of the Colony."

As to village areas, sanitation is still conspicuous by its absence; so it is not surprising to find that deaths exceed the births. But the sugar estates, which employ indentured as well as free labour, exhibit a contrast more than sufficing to show that disease preventive measures in rural areas would rapidly secure the chief requirement in economic advance in this Colony, namely, cheap labour.

As a result of minor anti-malarial measures, such as "the abolition of mosquito breeding places, screening of barrels and other receptacles, the free distribution of quinine to resident labourers and especially to children" the following marked decline of malaria cases treated in estates hospitals has been secured:—

Average for 5 years

1906-07 to 1910-11 .. ..	27,444
1911-12 .. ..	15,028
1912-13 .. ..	7,284
1913-14 .. ..	7,447

Nor has the influence of Applied Hygiene been limited to raising the value of capital spent in labour, by reason of decreased sickness. The majority of labour for British Guiana is costly because it is imported. But the following statistics show that whether the population be of

mixed age constitution (as found in the approach to village conditions of living of the free labourer) or be solely of the mature ages of both sexes indentured for labour, the mortality rate records are, as held in the Report, as good as obtained in "any civilized city in Europe" :—

	Birth-rate per 1,000 persons living.	Death-rate per 1,000 persons living.
Free on Estates ..	50·3	14·4
Indentured on Estates ..	....	9·6

Evidently, the estates which secured the major parts of these reductions in mortality and sickness of expensive labourers must have found that sanitation is a paying investment.

The Surgeon General concludes the Report with the following significant assertion: "Attention to the prevention of disease is urgently required in British Guiana, and possibly in no other colony can the direct benefit of remedial measures be so easily and so readily accomplished."

#### GIBRALTAR (1914).\*

The Annual Report of the Sanitary Commissioners of Gibraltar for 1914 is written by Lt. Col. G. DANSEY-BROWNING, R.A.M.C. This opens with information as to the physical characteristics of the Rock. He shows that it has an altitude of 1,408 feet above sea level at its highest point, and is 2½ miles long with a total acreage of 2½ miles. The town occupies a little over 104 acres; so that, obviously, the great importance of Gibraltar to the Empire is not with reference to its acres.

The Civil population at the Census of 1911 was 18,036. The people live largely in buildings of the type common in Southern Spain; that is, they are "built round a central courtyard or patio not infrequently covered in by a glass roof." This form subverses neither perflation nor the requirements of conservancy. The limited space at disposal has brought about an extraordinary density of population, 137·54 persons per acre equivalent to 88,025 persons per square mile. It is therefore a foregone conclusion that to maintain the health of such a population, subject to possible importation of disease from adjacent and independent Spanish territory, demands no mean sanitary alertness. That the administration has been successful, is shown by the crude death-rate being 14·97 against 16·17 of the previous year—the corrected death-rate for 1914 being 17·62 per mille.

Conservancy is of a mixed type. Whilst the central-northern parts are provided with sewerage arranged for the water carriage system, "the military quarters at Catalan Bay are served for liquid excrement only. Public pail closet latrines are provided for the Civil habitation whose liquid excrement and sullage water is disposed of by being thrown into the sea, or allowed to soak into the ground." Lt. Col. Dansey-Browning places this description of existing defects on record

\* Annual Report of the Sanitary Commissioners on the Health of Gibraltar for the Year 1914. [Medical Officer of Health, G. DANSEY-BROWNING.] 8 pp. 1915. Gibraltar: Garrison Library Printing Dept.



without remark ; and, as the whole Report bespeaks a keen appreciation of sanitary facts, it may be assumed that this silence is eloquent of hopes deferred, owing to "want of funds."

The water for drinking purposes is derived from rainfed tanks. The average rainfall for the last 12 years is 33·33 inches. This tank supply was supplemented in 1914 by distillation of sea-water, owing to the rainfall being less than the average and the greater demand by ships. Sea water is supplied by pipes by pumping from the sea. This is used for general sanitary purposes and, irrespective of the convenience, has had a beneficent effect in getting rid of "small domestic tanks," which, again, it is hoped will diminish mosquito prevalence.

Seven cases of typhoid fever occurred during the year. One of these was "in the case of an English lady, on a visit to Gibraltar, who partook of a meal at an inn at Los Barrios where the cook was suffering from the disease."

In detailing measures undertaken in cases of typhoid, Lt. Col. Dansey-Browning states that the useful precaution is taken of providing anti-typhoid vaccine for the protection of contacts. He follows up this statement by showing that more than 50 per cent. of cases of enteric fevers found in Gibraltar have apparently been contracted in the neighbouring districts of Spain and, consequently, advises those who for business or pleasure proceed thither should be protected by anti-typhoid inoculation.

Only three cases of undulant fever occurred, a fact that the Report contrasts with results at Malta where, in the financial year 1913-14, there were 338 cases and 25 deaths from this disease. These three cases were not traceable to goats supplying Gibraltar. Not only is routine bacteriological examination of the goats conducted but vendors are legally responsible that the milk is *boiled*, and this order also applies to the milk received from the neighbouring parts of Spain. In one instance the cook of a restaurant sacrificed himself to an impelling sense of duty ! He was required to boil the milk before it was issued, but "drank a glass of raw milk daily on its arrival to ascertain whether it was fit for sale."

Tuberculosis yielded a death-rate of 2·37 per mille of the population. In notified cases of this disease, the influence of environment is thus illustrated :—

Persons inhabiting one room tenements	..	24 cases.
" " two " "	..	6 "
" " three " "	..	8 "
" " four " "	..	4 "

The Rock possesses a "Tuberculosis Home and a Destitute Sick Fund." By these means not only is treatment afforded the tuberculous, but their necessitous dependants are aided and possible tuberculosis is searched for amongst them.

#### ASSAM JAILS.

In illustration of sanitary possibilities in India, the great reduction in mortality which has followed Applied Hygiene in British and Native Troops is often quoted. But the fact that a very great reduction in the mortality of jails has also been secured, is none the less noteworthy.

The troops are a picked body of men in the prime of life under discipline, but without the mental handicap of imprisonment, and resident in carefully selected surroundings, with the benefit not only of sufficient but of variety of food. Indian prisoners, on the other hand, are ordinarily mentally and physically of lower types and of mixed ages and sex, who have been subjected prior to their conviction, to diseases and dietetic vicissitudes common to a civil population, in the midst of improving but still poor hygienic surroundings. In the Bengal Presidency, in 1861, the death-rate amongst prisoners was 96·7 per mille, whilst in Bengal proper and Assam it was 87·7 per mille. In 1900-04, in all India, the average rate had decreased to 25, and in 1905-09 to 24 per mille. In 1911, the rate for all India was 18·44; in 1912, 16·74; and in 1913, 16·56 per mille. These figures are the more creditable, in view of the fact that there are still in use buildings that are not in accord with modern ideas of hygiene, and with water supplies and surroundings which do not fail to turn the balance towards preventable mortality.

But, in "the land of regrets," the criminal is not the first or only charge upon public funds, and the total average is depreciated by a few marked exceptions. Thus, the fortunately small population of the Assam jails, according to the Report for 1914, shows the following heavy mortality rates per mille from 1911 to 1914, 54·36; 36·10; 40·87; 43·53. In the jail of Sylhet, where 33 deaths occurred, 50 per cent. were due to dysentery. The Inspector General of Prisons, Assam, makes the following remarks on the subject\* :—

"In connection with the subject of dysentery I issued instructions to all Superintendents to administer Manson's mixture to all new admissions so as to estimate the amount of ankylostome infection and to deal with it. Where the figures can be relied upon, the results show that there is a considerable proportion of the free population infected, amounting to 49 per cent. in Gauhati and 44·70 per cent. in Dibrugarh. It is curious that the Sibsagar sub-jail should show a percentage of 22·72, whilst Jorhat shows 56 and Nowgong 3·45, but I am not sure that the latter figures are accurate."

The population of the Gauhati jail (mortality 52·49 per mille) is thus described :—

"This is another jail with a large incidence of dysentery cases. . . . Noticing the high case-mortality in our jails, I issued instructions in May last directing that no patient was to be placed under observation for more than 24 hours, and that if after that period he was unfit to do work he was to be admitted to hospital. It appears that until the receipt of these instructions a large number of cases had been treated in this jail as observation cases, the duration of this observation extending to as many as 42 days.

"At my inspection I have been struck with the poor condition of prisoners on admission to this jail, which can be easily understood when we find that 49 per cent. of them are infected with the *Ankylostoma duodenale* and 17 per cent. addicted to opium and ganja."

Quinine was given as a prophylactic in 15 grain doses to all prisoners from May to October. In one jail the Superintendent gave 10 grain doses three times weekly, "on the ground that prisoners could not stand the larger doses." Of 369 cases of malaria fever admitted for treatment, 254 occurred during the period of prophyllaxis.

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\*Report of the Jail Administration of the Province of Assam, 1914. p. 12.

## DISEASE PREVENTION.

## MALARIA.

*Major Anti-malarial Works.*

*Hongkong.* During 1913, 18,140 dollars were spent in continuing the effort of training the nullahs as an anti-malarial work. Up to the end of 1913, nullahs have been trained and cement channels have been laid down to the extent of 11·6 miles. Twenty-one qualified British whole time Sanitary Inspectors are employed, and include in their routine duty oiling of pools and minor sanitary and anti-malarial works. The population of the Colony fluctuates greatly in ordinary times, but this was markedly so in 1911, 1912 and 1913, when some 40,000 to 50,000 refugees, in connection with political disturbances, entered the Colony. The following figures exhibit the influence of the still incomplete works. The fluctuation in result with troops is necessarily open to the interpretation of "depending on the healthiness or otherwise of the last station occupied by the troops."

Admissions to hospital per mille :—

Years.				British troops.	Indian troops.
1909	..	..	..	138·4	54·3
1910	..	..	..	177	89·8
1911	..	..	..	125·5	31·8
1912	..	..	..	84	83·2
1913	..	..	..	42·5	83·9

In regard to the general population, subject to the wide fluctuation in numbers stated, as might be expected the results are not so marked ; but the influence is unmistakable.

The deaths from malaria per mille of the general population were in 1909, 1·2 ; 1910, 1·7 ; 1911, 0·9 ; 1912, 1·1 ; 1913, 0·7.

*Malaya.* During 1913, in Singapore, there was spent in dollars, for reclamation of swamps by filling and by drainage 10,000, for subsoil drainage of malarial swamps 10,000, for minor anti-malarial works 5,000 ; in Penang, for miscellaneous anti-malarial work of the same character, 83,497 ; and, in Malacca, for surface drainage 2,903.

*Uganda.* The drainage of swamps " in or adjacent to the stations of Kampala, Masindi, Hoima, Mbale and Bukakata was continued during the year [1914] and drainage of marsh land at Entebbe was begun."

*Zanzibar.* During 1913, a sum of Rs. 19,068 was spent in drainage work " on two areas which formerly were constant anopheline distributing centres." A further sum of Rs. 10,000 was sanctioned for further drainage work during 1914.

*Southern Nigeria.* " In routine reclamation and drainage £4,239 was spent in 1913."

*St. Kitts Nevis* (total population 42,279) spent £100 under this head.

*Mauritius.* Anti-malarial works of a permanent character are being undertaken over the whole island, costing Rs. 1,000,000 approximately. A sum of Rs. 150,000 is annually provided for this purpose. Evidently here the object lesson of drainage in the vicinity of the Phoenix Barracks, as advised by Sir Ronald Ross, has not been forgotten. The nature of the works is thus described :—

“A general anti-malarial campaign has been started and works of a permanent character carried out, particularly in the districts of Pamplemousses, Flacq and Black River. Rivers are being canalized and cleaned, marshes reclaimed, and objectionable collections of stagnant water removed. Works of a minor character continue to be carried on, such as filling of canals, trenches, upkeep of permanent works, etc.”

During 1914, Jamaica spent £3,661, approximately, upon—reclamation of swamp land of Kingston, Pen, Port Antonio, Warner's Pond Swamp, St. Ann's Bay, Thornton Swamp; and upon concrete drains in Kingston, Portland, St. Mary, St. Ann, St. James, Hanover, Westmoreland, St. Elizabeth, Clarendon and St. Catherine.

The above facts are culled from the Official Returns, in the form of replies to queries, as recorded in the Report of the Advisory Committee for the Tropical Diseases Research Fund, 1914. More information as to progress would doubtless be available, were it not that the otherwise useful forms enjoined by the Colonial Office are differently interpreted by those concerned. In certain areas, Medical and Sanitary expenditure are lumped together, and no classification of expenditure on the latter account is given.

#### *Rhodesia.*

In Southern Rhodesia, during 1914, there were 569 Europeans and 169 natives admitted to hospitals on account of malaria, against 779 Europeans and 241 natives in the previous year. The mortality for Europeans was 0·53 per cent. and for natives 4·73. The reduction of malaria is due to small rainfall during the previous wet season. At the same time, it is hoped that already the visit by General GORGAS and Sir Patrick MANSON is exhibiting influence. Much anti-malarial literature has been issued “in tabloid form” to settlers at cost price. Chemists, storekeepers, post offices and certain Native Commissioners' offices have been utilized for sale of quinine, and it is hoped to include railway stations. These arrangements “have been largely taken advantage of.” It is reported that in spite of the decrease in malaria, there was no marked fall in the blackwater fevers admitted to hospitals this year.

#### *Sierra Leone.*

In his “Annual Report on the Medical Department for 1914 (Sierra Leone)” the Principal Medical Officer, Dr. RICE, states that in Freetown 1,027 cases of malaria were treated, and that of 282 diagnoses made microscopically the parasites were found in the following variety and proportion :—

Subtertian	..	..	74·5	per cent.
Quartan	..	..	20·2	„ „
Benign	..	..	0·69	„ „
Mixed	..	..	4·6	„ „

*Formosa.*

The Japanese in Formosa promptly recognised that to get rid of malaria would be a "scientific conquest, which will make great contributions towards the development of the rich Island of the Far East."\* As a preliminary, certain areas were selected for experiment, chiefly in the direction of quinine administered to proved malaria parasite bearers. They were selected as follows:—

"All the inhabitants and sojourners in the locality are summoned up *en masse* on a day appointed (once a month in general) and by means of an ear-lap-pique of everybody, a thin blood film preparation is made, which is, after staining with diluted Giemsa's stain, subjected to microscopical examination for malaria-parasites. The parasite-carriers thus discovered are compulsorily administered Quinine preparation, after Nocht's or modified calender. They are placed under such medical treatment for 30 days during two months, so that the parasites shall be practically exterminated. The preparation is Hydrochlorate of Quinine in tablet (0.2 gram) Euchinin powder (for children and some special cases) and Esanopheles pills (for Splenomegaly); and these are given gratis under strict control of police officials."

In this way, 396,621 people were examined, of whom 11,396 were found to be "bearers," and were treated with quinine accordingly.

The following is an abstract of the table given by the author showing results secured:—

*The Death and Malaria Death-rate in some Localities before and after the Work commenced.*

		Chikutoki.	Ako.	Karenko.	Bokusek-kaku.
Preceding Year.	Population	—	5,000	2,500	1,000
	Death-rate	—	35.80	38.40	34.00
	Malaria death-rate	—	5.00	11.60	15.00
1 Year	Average Population	1,870	5,400	2,836	1,001
	Death-rate	48.13	35.00	41.60	27.98
	Malaria death-rate	—	—	6.34	—
2 Year	Average Population	1,652	5,997	3,537	1,215
	Death-rate	45.9	39.7	31.66	23.78
	Malaria death-rate	0.6	—	3.39	—

*Crab-holes and Mosquito Breeding.*

Dr. W. E. GIBLIN, in the Annual Report for Papua, 1913-14, states though there is no evidence of malaria as yet in the Samarai Island, anophelines are there ready to perform their function. He states:—

"I have frequently searched for their breeding places, and at last have been rewarded by finding some larvae within a few feet of my front door.

\*HATORI—Antimalarial Campaign in Formosa.—*Far East. Assoc. Trop. Med. C. R. Trois Congrès Biennal. Saigon, 1913 (1914).* p. 501.

Heavy rains had caused the ground water to rise and flood several crab holes; larvae were found in the entrance to several of these holes. Apparently during the dry weather the larvae recede into the holes with the descent of the water, and there lie dormant until conditions again become favourable for their growth and pupation. This supposition seems quite probable, as in captivity the growth of larvae may remain stationary for many weeks if conditions are unsuitable."

### *Fish Larvicides in Wells.*

Whilst the utility of stocking wells with fish is duly acknowledged as a useful anti-malarial measure, statistics showing results of their action are difficult of attainment. Dr. K. RAGAVENDRA RAO, Special Malaria Officer, Madras City Corporation (in a Report embodied in Madras G. O. N. 937 M., 25th June 1915), makes a useful appreciation of facts. Apparently, no exact estimate of the proportion of larvae-bearing wells before commencement of operations was available. As the Report extends over the period from September 1913 to January 1915, the question of seasonal influence may, perhaps, be put aside. The reporting officer is at least well justified in claiming the results as "encouraging" :—

"The introduction of these larvicidal fish into wells, etc., was started in September 1913 as an experimental measure and an amount of Rs. 4,000 has been spent and the operation is being continued, the men working now at Georgetown. I am making an investigation into the efficacy of this measure and so far I can say it is an encouraging one. Whereas almost every well examined before the introduction of fish for mosquito larvae was credited with a positive result, only 72 of 788 wells examined subsequently or 9.25 per cent. were found to contain anopheles larvae. The following table makes the point clear :—

"Total number of wells examined, 788. Number in which fish were dead, 108. Number of wells in which anophelene larvae were present, 72 or 9.25 per cent. Remarks.—The larvae have been found in wells where fish were alive.

"Fish have till now been introduced in nearly 8,000 wells.

"Here again we are confronted with one difficulty and that is in some cases, especially where the wells are filthy and disused, the fish introduced die out soon, and it requires careful watching of every well from time to time to see that the fish introduced continue to live. To this end it is proposed to retain an establishment of one maistry and ten fishermen whose sole duty it is to continue the operation over the whole town and at the same time, reintroduce the fish where they are once put in and where they may die."

### *Silt.*

The economical disposal of silt confronts both the sanitarian and the engineer—the latter more especially in respect to the working of irrigation canals, and the former as to change of configuration of land and diversion of streams with attendant malaria propagation. The agricultural benefits of silt depend very much upon the nature of the silt, and the time of its arrival on the land; whilst it can be but rarely that the engineer is rid of trouble as to silting of his irrigation canals and channels, even if a scheme for disposal were to benefit the agriculturist. Natural lakes of extraordinary depths at times fulfil the function of arresting silt successfully, but silting reservoirs, other than for waterworks (when prompt removal is effected), have not been much employed for the purpose. An article by the Consulting

Engineer, United States Reclamation Service (Louis C. HILL),\* shows that the Colorado River is so loaded with silt that the headworks of the irrigation canals are liable to fill up, and the natural stream beds tend to be so raised as to endanger the flooding of town areas.

The remedy proposed is of a radical character. It is calculated that at a certain point "the silt in suspension equals  $1\frac{1}{2}$  per cent. by weight of the river volume." In a compact mass, the silt weighs from lbs. 75 to lbs. 80 per cubic foot. A dam on this river is to be "first built 318 ft. high from foundation to parapet wall, but the gates and other structures are designed so as to permit increasing the height by 40 or 50 feet, thus increasing the capacity by 3,000,000 acre-feet, which additional capacity would provide storage for all the silt brought down in 250 or 300 years. Later more expensive reservoir sites could be developed, or the dam raised still higher, extending the life of the project indefinitely."

It is reckoned that "the cost of providing silt storage on this basis would not exceed  $\frac{4}{100}$  cent. (four-tenths of a mill†) per cubic yard."

It is therefore possible that at times it may be cheaper to afford such storage for silt than to encounter the recurring expense for keeping irrigation canals clear, and then to pay landowners for storage room near the banks! The whole subject is of great importance in respect to land reclamation and anti-malarial measures in areas subjected to irrigation.

### *Oil Films.*

Exactly how much oil is required to make a satisfactory film has an interest in the economics of anti-mosquito measures. Certain experiments by Professor Henri DEVAUX (Faculty of Sciences, Bordeaux) incidentally throw a light on the subject. In a paper embodied in the Annual Report of the Smithsonian Institution for 1913, he explains how he arrives at the thickness of a film of oil. He made a standard solution of pure oleine in benzol, so that in the pipette employed by him one drop would be equivalent to  $\frac{1}{50.666}$  of a cubic centimetre of oil. He found that two drops of oil on water spread so as to give an area of 363.71 square centimetres: therefore, he reckons that the thickness of the film was  $\frac{V}{S} = \frac{400 \times 10^7}{363.71} = 1.10$  mm. with an approximation between 1.04 and 1.15 mm.

### YELLOW FEVER.

#### *Shanghai.*

Dr. Arthur STANLEY, Municipal Health Officer, Shanghai, in his Annual Report for 1914, gives the following opinion as to the possibilities of invasion by yellow fever:—

"The opening of the Panama Canal brings nearer the possibility of yellow fever coming to China, especially if vessels come direct from infected

\* Engineering Record, 1914, Dec. 5.

† Mill = one-tenth of a cent, U.S. money.

ports in the Gulf of Mexico and other places. If introduced to China, it is likely to spread on account of the prevalence of the *Stegomyia scutellaris* mosquito which is closely allied to the *Stegomyia fasciata*, the known carrier of yellow fever. There is now greater need than ever for anti-mosquito measures in Shanghai."

### *The Philippines.*

The following is the opinion of Surgeon HEISER\* as to yellow fever possibilities :—

"In addition to the serious danger which constantly threatens the Philippines on account of their close proximity to thickly populated centres in which quarantinable disease is always more or less present in epidemic form, there will be the additional menace of yellow fever being conveyed by vessels that pass through the Panama Canal. While it is not likely that yellow fever will exist to any appreciable extent in the Canal Zone, yet its presence in contiguous territory and at ports of call at which such vessels are likely to stop constitutes a source of danger to the Philippines. The introduction of yellow fever into the Philippines would be a great calamity because of the presence and very wide distribution of a mosquito, which apparently is the same as the one which acts as the intermediate host in other countries. The *Aedes (Stegomyia) calopus* has been greatly reduced in numbers by the anti-mosquito campaign which has been conducted in Manila during the past few years, but when these efforts are slightly relaxed they soon reappear in large numbers."

### VOMITING SICKNESS.

Whether or not vomiting sickness is a form of yellow fever is an important matter which has long been disputed. Dr. Harold SCOTT, Government Pathologist, Jamaica, thus gives his opinion on the subject :—

"1. That the weight of evidence is against the disease being due to a bacteriaemia.

"2. That the rapidity of progress of symptoms with early fatal termination (or, in rarer instances, rapid and complete recovery) rather indicate the action of a poison.

"3. That, in view of the early symptoms being gastric, and the cerebral succeeding soon after, this poison is produced in and absorbed from the stomach; (the gastric and duodenal congestion present tend to support this).

"The only suggestion I can offer as to the source of this hypothetical poison is that, since one can never obtain any history to implicate any particular article of food, it is due to something which is apparently dangerous only at certain times of the year, some fruit, perhaps, or vegetable, or what, in my opinion, is more probable, some growth (fungus, yeast, mould, etc.) on or in this food, rendering it toxic.

"The disease rarely attacks adults, as it would if it were due to ordinary food poisoning; it almost never attacks the infant in arms, but it attacks mainly those at the toddling age (75 per cent. this year); amongst the poorer natives the children get the minimum of attention, and there is every opportunity for them to pick up unripe, or otherwise unsuitable, food from the ground and eat it, without their parents even being aware that they have done so."†

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\* Annual Report U.S. Public Health Service, 1914. p. 149.

† Report of the Advisory Committee for the Tropical Diseases Research Fund for the Year 1914. p. 230.



## KALA AZAR.

A Supplement to the Sanitary Report of the Province of Assam, 1913, has been published, which contains the results of kala azar surveys by Major F. McCOMBIE YOUNG, I.M.S. (Deputy Sanitary Commissioner, Assam) and Major BODLEY SCOTT (Civil Surgeon, Sylhet) respectively. The object held in view was not research as to nature of the disease (concerning which a special officer has been deputed for duty—Major MACKIE, I.M.S.) but to ascertain the limits of Assam actually infected. The former reports that in the area allotted to him he visited all the districts said to be infected, and verified the existence of kala azar "by splenic puncture of selected cases." Care was taken not to employ the method more than essential, lest, by producing unpopularity of the operation, future preventive measures might be prejudiced. The following method, as suggested by Major MACKIE, was that employed :—

"An all-glass hypodermic syringe, with several needles, was sterilised before going out for the day. A bottle of tinct. iodi. and one of liquid carbolic acid was carried, and a box of carefully cleansed slides.

"When the confidence of the villagers had been obtained, in the course of palpation of spleens with the patients recumbent, tinct. iodi. was applied to the skin over the spleens of all examined. In a selected case with a hard spleen and no evidence of excessive blood deterioration, a drop of carbolic acid was also rubbed into the skin over the area for puncture. When the skin over this area had become somewhat numb, a sterilised needle, carefully concealed in the hollow of the left hand, was rapidly plunged into the spleen and the patient's attention attracted elsewhere, while my assistant rapidly fitted the syringe to the needle, withdrew a drop or two of fluid and made the films. In most cases the puncture was thus accomplished without the patient being aware of any unusual proceeding. The patient was always cautioned to lie down for the rest of the day, and a dose of calcium chloride administered before leaving. In this way punctures were performed with as little fuss as possible, and no bad results occurred."

In differentiating cases of malaria from kala azar, on clinical grounds, Major McCombie Young states :—

"I noted that, if towards the end of the cold weather one found a family of two or three children suffering from enlarged spleen with a history of infection during the preceding hot weather, and with a history of improvement of health in all cases instead of deterioration, one might assume that the infection was malaria and not *kala-azar*, in which disease the general tendency is towards death and not towards recovery."

As to sex incidence, he found only 31·2 per cent. were females but suspects error on account of the greater timidity of female children. Of the cases seen 76·6 per cent. were 20 years of age. 87·2 per cent. were persons engaged in agriculture; but he places no stress on this fact, as the majority of the people in the area examined are so employed. Similarly figures gained as to caste of those infected could not be utilized satisfactorily, without an analysis of castes in the area; but he considers the extent of infection of the Kacharis in Mongaldai within areas named by him worthy of note. A previous history of infection in the family of infected persons was found in 50·1 per cent. In 61·5 per cent. of cases the houses were situated in "light jungle"; 30·5 per cent. were near running water, and 8·9 per cent. near tanks; 40·1 per cent. got water from wells, 20·6 per cent. from tanks and 34·0 per cent. from running water.

"74·4 per cent. of infected families possess cattle, 51·0 per cent. keep fowls, 42·7 per cent. keep dogs, 37·2 per cent. cats, then follow pigs, goats and pigeons in a decreasing ratio. The comparatively small number of infected families which keep dogs seems to indicate that the dog is not concerned with the propagation of the disease in Assam, and this observation is in line with the research work of Donovan and Patton in Madras."

This analysis, whilst conveying much of value, says nothing as to method of conservancy, condition or nature of habitation, methods of clothes washing and bathing, of possible sources of contamination of water supplies, peculiarities of food and habits in connection therewith, or of entomological circumstances.

By contrasting the past histories of epidemics in areas examined and their present condition, Major McCombie Young is able to establish the fact that epidemic waves, after lapse of considerable periods, leave the country practically free of the disease. On this subject he states :—

"The reason why the disease should have persisted in certain areas, and should have more or less died out of others in which during the epidemic years it was equally active, is a curious epidemiological fact that requires explanation. There is no apparent reason why this should be so, and the fact that determines it may be one of the factors in the causation of the disease at present unknown, or unproved. Possibly further research in those areas may discover this factor. . . . The almost complete disappearance of the disease except in a scattered sporadic form is noteworthy when the past records of the disease in this district are examined, and it is interesting to note that in the tract of country in which it first appeared within the jurisdiction of Assam administration, it is now almost absent. Can a racial immunity have been acquired in the 50-60 years which seem to have elapsed since its first appearance ?"

Major McCombie Young's recommendations as to prevention are founded upon the belief that the disease is originally started in an area by the importation of an infected person. He thus expresses his views :—

"An area gets infected by importation. The infection spreads and a panic is established. Infected families who have lost one or two of their number and see others dying, decide to migrate elsewhere to an uninfected area. They do so, if unchecked, taking with them an infected person, or the seeds of the disease. This leads to the propagation of the disease in this area and the process then repeats itself. The people themselves are well acquainted with this and will often refuse to allow an infected family to enter their village, or to permit a member of an infected family to enter another by marriage."

Thereupon he suggests a scheme for keeping the people under surveillance by means of travelling dispensaries (distinct from those dealing with general curative measures) under the control of the Sanitary Department.

As regards the Sylhet District the enquiry conducted by Major Bodley Scott, independently of Major McCombie Young, also supports the opinion that the importation of an infected human being is the first step in an epidemic. The following are extracts from his Report :—

"The cases have been found very definitely localised in distinct foci. Certain villages or small groups of villages within a thana are infected and have in most cases been infected for several years, while the neighbouring villages are free. Within a village the infection is localised in one or two houses or in certain rows of houses, where again it is found to have existed for long periods, the surrounding houses escaping. The spread from one village to another and even from one house to another seems to be a very slow process."

"A single case within a household was found to be a very rare occurrence. Almost invariably one member of the family after another had developed the disease and this process had in very many cases continued until the whole family was carried off. . . . Jaldhup contains the largest number of kala-azar patients. There is an old focus of the disease in this thana affecting a compact group of villages around Tilpara dispensary, which is known to have existed for the last 12 years. I shall refer to its history again. I visited the place in February 1912, made spleen punctures, and saw many cases of kala-azar and plain evidence of the ravages of the disease. Rows of deserted '*baris*' (houses) or abandoned dwelling sites were to be seen where whole families were reported to have been gradually carried off by kala-azar. Though the disease shows little tendency to die out, it has remained localised in this small group of villages for years and does not seem inclined to spread into the surrounding neighbourhood. . . . It may be remarked that all these lie in country which goes under water for half the year, when each village is a small island and the inhabitants lead a semi-marine existence."

### *Spleen Punctures in Diagnosis.*

Puncturing the spleen, although largely conducted with safety, is a method in diagnosis which many would gladly dispense with as far as possible—more especially the subject observed. Dr. C. M. WENYON\* states :—

"On a case of kala azar which was in the Albert Dock Hospital, under the care of Dr. Sandwith, I was able to test the possibility of culturing leishmania from peripheral blood. Six tubes of N.N.N. medium were inoculated each with two or three drops of blood obtained by pricking the finger of the patient. Eighteen days later there was a culture of flagellates in each of five of the tubes which were not contaminated with bacteria. The culture method may thus be employed as a means of diagnosis in this disease and it is a method which is not so distasteful to the patient as either spleen or liver puncture."

### DYSENTERY AND DIARRHOEA.

#### *Somali Diarrhoea.*

In Somaliland the milkman is not content with economising his supply of milk by the use of water; according to Dr. PAGET, Senior Medical Officer of the Protectorate, there is practised an unusual adulteration of camel's milk :—

"Another group of cases comes directly under the heading of direct malicious intent. These are the adulteration of camel milk with the white extremely irritant juice of euphorbia trees. Milk diluted with water to which the above vegetable sap is added is not easy of recognition by the lactometer. In every case severe vomiting and purging result, frequently to a dangerous degree. The difficulties in securing the offenders is often great, as during part of the year the supply of fresh milk is hard to obtain on the coast anywhere. If, as has not infrequently occurred, the milk is needed for sick Europeans or is supplied to the hospitals for sick Indian troops, the offenders are often assisted to escape recognition. Commandeered milk, for however urgent a purpose, is under local conditions always very risky, no price seeming to influence attempted malicious adulteration."†

\* Report to the Advisory Committee, Tropical Diseases Research Fund, 1914, p. 93.

† Somaliland Annual Medical Report for 1914. (Received in Colonial Office, June 15, 1915).

A vaccinator in another part of the tropics, pressed for a supply of vaccine, has been known to substitute the irritating juice of this adaptable plant for the genuine material.

### *Flies and Bowel Affections.*

In the Report of the Surgeon General, British Guiana, for 1914, it is stated that in the Almshouse and Orphan Asylum having an average of 775 inmates, efforts to reduce the prevalence of flies by various methods, especially the use of the formalin spray, "have been efficacious. The numbers of cases of diarrhoea and dysentery have been reduced to half and the deaths to one-quarter of the average for the previous four years."

### *Dysentery and Liver Abscess.*

To those readers of Section 1 (European Army) of the Annual Report of the Sanitary Commissioner with the Government of India for 1913 who have reminiscences of Netley, the mention of Secunderabad of "dysenteric notoriety," in para 17, will bring back memories of a much respected veteran teacher who has joined the majority. That this place in spite of sanitary advance should, according to the Report, yield "a larger number of cases than any other station" is of interest having regard to its previous history. It is further asserted that this station has also yielded the largest number of cases of abscess of the liver.

"The essential cause of the prevalence of dysentery could not be ascertained; every probable source of origin was investigated and a weekly inspection of all cooks, sweepers and followers generally, in the hope of finding "carriers," was made without success. All cases were treated with hydrochloride of emetin (half a grain twice daily) hypodermically. . . The most marked characteristics in connection with this year's reports on dysentery has been the success following the use of hydrochloride of emetin administered hypodermically in the amoebic type of the disease and the remarkable reduction in the number of hepatic abscess cases."

Surgeon General MACLEAN taught that the use of ipecacuanha in dysentery diminished the chances of hepatic abscess. In the official Report on the health of British troops in the Madras Presidency for 1873, the following references occur: "Dysentery specially yielded to ipecacuanha in 1859 and should not be forgotten. . . . The prompt and early treatment of dysentery therefore appears, so far as we can see at present, to be the most certain means of diminishing the losses of the Army by hepatic abscess." Obviously the pioneers of that period with the means at disposal drew correct inferences which, thanks to Sir Leonard ROGERS's valuable work in the light of later science, have been proved to be correct.

The diminution of hepatic abscess with less incidence of dysentery is thus stated :—

Year.	Ratio per 1,000.			
	Dysentery.		Liver Abscess.	
	Admissions.	Deaths.	Admissions.	Deaths.
1909 .. ..	11·2	·25	1·4	·43
1910 .. ..	7·7	·23	1·0	·48
1911 .. ..	7·7	·26	1·0	·46
1912 .. ..	5·2	·15	1·7	·32
1913 .. ..	5·4	·11	·5	·20

A search for the particular source of infection by the *Entamoeba histolytica* at Trimulgherry might well repay special effort by the Indian Research Fund. The persistence of a pathogenic agent, such as shown in this area, should facilitate the discovery of the necessary conditions.

### PLAGUE.

#### *Plague Factors.*

The flea has occupied so great a place in reference to plague that the suggestion that other agencies may bring about transfer of the *B. pestis* is generally put aside by the statement that, whilst theoretically possible, they are of little or no epidemiological importance. Yet to the practical sanitarian, whilst to devise methods to meet the flea and its bearer is essential, the neglect of minor possibilities of infection might imply waste of both energy and money upon the major cause. In this spirit, the Medical Inspector, Sanitary Bureau, Government of Formosa (Dr. KURAOKA) urges that whilst to the flea the pride of place must be yielded, other factors cannot be safely ignored. At the Saigon Conference\* he stated that from personal examination of 40 patients he found in 25 per cent. "such slight wounds as scratches, stings and ulcers (non plague) which might with good reason be looked upon as the possible passages for the plague bacillus." In 1896-9, at the Taihoku Infectious Diseases Hospital, of 229 patients 28·83 per cent. had wounds on the bodies. In 1900 at Taihoku and Tainan, of 734 patients (24·66 per cent.) the same could be said.

"When plague, contracted through invisible wounds, pneumonic plague abruptly occurring during the prevalence of bubonic plague without being preceded by plague pneumonic cases, tonsillar plague, and cervical plague, which is apparently contracted through the mouth, be added to the list the percentages will be markedly raised. Then through what agencies have the rest of patients been infected with the plague bacillus forms a final question to be explained. . . . In short, though I believe

\*Far East. Assoc. Trop. Med. C. R. Trois. Congrès Biennal, Saigon, 1913 (1914), p. 204.

that conveyance of plague from rat to man is largely effected by rat-fleas, particularly by *Loemopsylla cheopis*, yet it is absurd to charge them with the whole responsibility. . . . I am of opinion that at least one-third, perhaps more than that, of human cases are caused by contact with inorganic matter contaminated with the plague bacillus."

### *Control of Rats.*

Dr. Francis CLARKE, Medical Officer of Health, Hong Kong, placed before the Sanitary Board a Memorandum, in which after pointing out that systematic poisoning of rats, house cleaning, the filling up of rat runs, the use of gratings and other measures have been adopted, he declared there was no reason to believe any permanent decrease of the rat population had been secured. He holds that "the only feasible method of limiting their numbers is to limit the food supply available for them; this consists mainly of the waste food from dwellings, markets, factories, etc., and rats will enter houses at night to search for food and will also feed in the yards and lanes surrounding them if garbage is to be found there." He stated that the Sanitary Board had adopted rulings as to storage of garbage in covered bins, and that various efforts towards rat proofing had been made, but the success depended upon the cooperation of householders which was not at present of the necessary energy. He would therefore put aside direct methods of attack upon rats and would advise as follows:—"All our efforts and all the efforts of the community should be concentrated upon the speedy removal of refuse of all kinds from the precincts of dwellings and offices, and no measure which will help to exclude rats from these premises should be neglected." The Governments of both Burma and Mysore have already abandoned the direct crusade against rats, in favour of methods such as are suggested in Dr. Francis Clarke's Memorandum.

### *Spread of Plague by Rats.*

Surgeon R. H. CREEL, United States Health Service, has recently published the result of an interesting experiment conducted by him on migration of rats in connection with plague spread.\* He quotes the Indian Plague Commission's statement in the *Journal of Hygiene*† as showing that with English writers the question is held to be of negligible importance and that they had "observed nothing to show that rats are in the habit of migrating, e.g., from one quarter of the City (Bombay) to another."

He marked 179 rats on the ear, so as not to be over conspicuous to their fellow rats. Trapping was ceased for ten days in the area from which they were taken, but was allowed to progress in the rest of the City of Orleans. On the expiry of this period, the rats were let loose at midnight. Ten were found dead at the end of twenty-four hours, within a short distance of the point at which they were released; in 48 hours, nine more were found dead. He considers "these had died from injuries incident to their captivity." But, between 48 to 60 hours "one half-grown *norvegicus*" was found about one mile away.

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\*U.S. Public Health Repts., 1915, June 4, p. 1679.

†1907. Vol. 7, pp. 886, 907, 947.

Within two weeks "a number of rats were retaken from points four miles distant from the site where they had been released in a residential part of the city."

A second lot of 113 marked rats was then released in the wholesale provision warehouse district, where plenty of food and good shelter were available. Surgeon Creel states, "whereas 40 rats of the 160 from the first series (this number excluding the 19 dead found near point of liberation) made wide spread excursions, only 8 from the second series (113) made any extensive travel." The different opportunity for food and harborage in the two sites where the respective batches were liberated "was assumed to be sufficient reason for difference of migration." Surgeon Creel then applies the moral of his experiments as follows :—

"The practical bearing of this study upon epidemiologic considerations of plague is very apparent. Had these rats at time of release been in the very earliest stage of the incubative period of plague there can be no doubt that their excursions would have been similar, though for shorter distances. That a spread of the epizootic would have resulted by a series of 'relay' rodents seems only too probable. Quite frequently in an infected community isolated cases of human and rodent plague are found well removed from any other known focus of infection. The irregular travel of rats sufficiently accounts for this and explains the broad stretches of presumably non-infected territory between foci. As early as 1906, Thomson in Australia noted this extension of infection 'per saltum', but offered no explanation for the phenomena."

If Surgeon Creel implies that if an infected rat be introduced with merchandize into a city it may travel in the way indicated, the writer would agree with him. But this is quite a different matter to discussing spread of plague from one point to another in the same town, by means of the original rat inhabitants of a particular area. Besides the sufficiency of food and available shelter, the rats Surgeon Creel liberated must have had to consider or actually experience the doubtful welcome likely to be given by rats in possession, they being notoriously devoted to "scraps" in more than one sense.

A rat let loose in the residential quarter would be more likely to come in contact with rats determined to protect their scant resources than would be the case in the wholesale provision area. Hence the greater or less effort to secure a near home. Even if a rat were liberated near his old home, the chances of his being received amicably by his late harem might be small. Instead of the evidence pointing to spread by habits of migration, it might equally well be interpreted as showing strenuous tribal discipline requiring the stranger or the discredited and returned captive to "move on." In epidemics in India nothing can be more definitely marked than the prolonged period during which rat infection may be limited to small areas. In prevention of disease spread, the point at issue is of importance in deciding the value of "observation staffs" on special duty, in advance of plague infection of communities. Granted a failure to detect importation, such staffs on the spot have yet another hope of preventing general spread, by prompt and radical effort in such areas. To accept the view that a "residential" rat is, under normal circumstances, liable to "irregular travel" to the extent of two miles per week, would imply a wholesale scattering of infection which is contrary to general experience.

The following is an extract from a published official Report by the writer (April 1903):—

“In the matter of infection of rats, I have always maintained that unless infected rats be actually imported alive in a locality—as may happen in bales of merchandise—or become infected in the locality by imported material, they do not *originate* plague by extending from an infected to a healthy area, except in cases where the places are very close to each other. To endeavour to arrive at some conclusion as to the extent to which infected rats spread from the original point of introduction of plague (Nalbund Lane) I caused Certificated Sanitary Inspector Pranatharthihara Aiyar to prepare the accompanying plan, showing the outside limits at which dead or supposed infected rats were found.”

This diagram showed that the limit of infected rats, notwithstanding continuity of streets, did not extend beyond half a mile from the original point of infection, although an epidemic period of five months had elapsed. Further experience on the subject was, in an Official Report published in 1905, thus expressed by the writer:—

“I accept as a working hypothesis that rats live in clans. They probably have their own limits of haunts, and have methods of government. They appreciate the fact that residence in some localities may be undesirable. If the food supply becomes insufficient, or deaths from diseases or malicious poisoning by man be frequent, it is realised it is time to ‘clear out.’ Consequently, whether rats are poisoned, or attacked by plague, or other diseases they will seek safety in flight. The crucial point is how far do they flee. I believe this can only be answered by stating that they do not flee one yard further than they are obliged, having regard to previous occupation of the nearest healthy area by another clan of rats, the amount of food available and freedom from worry by man, disease, or poisoning; and that whilst in towns, if plague accompanies them, they may from time to time move and thus increase the area of their influence in spreading plague, it is unlikely any single migration ever extends beyond half a mile at a time.”\*

Nevertheless, Surgeon Creel’s experiments certainly usefully indicate the possibility of an infected rat imported in merchandise, by rail or sea, escaping from the site where first dumped, finding itself without welcome by rats in the proximity, and of necessity wandering to distant points in the interests of self preservation. A “Wanderlust” by instinct, as suggested by Surgeon Creel, as well doubtless as the writer’s hypothesis, requires further proof.

#### CHOLERA.

##### *Zanzibar Jail.*

In 1912, there was an outbreak of cholera in the Zanzibar Jail. In a population of 115, there were 42 attacks with 22 deaths. The exact mode of introduction could not be traced. From August 5th to the 10th there were 31 cases. Two iron drums containing water were used in the cells—one for drinking, the other for ablution after defaecation. There was reason to believe they were used indifferently. The prisoners were removed to Quarantine Island on the 9th August.

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\* See also suggestive evidence by Professor BOYCOTT, Sanitation Number of this *Bulletin*. Vol. 4. p. 205.



The drums were then locked and provided with taps. Captain D. T. SKELTON,\* R.A.M.C., states :—

“ But even this precaution did not stop the disease entirely. I then adopted the plan of making each man wash his hands in a strong solution of carbolic after he had been to the latrine. As a warder accompanies a prisoner on these occasions it was made a matter of discipline that the warder should see this order carried out. Further every prisoner before being given his food was compelled to wash his hands in a large sufuria of strong carbolic. These extra washing precautions were only brought into force on the 21st and the effect became apparent, because between August 21st and August 30th there were no further cases of cholera. I have recently learnt that in an epidemic of cholera in a jail in Manilla the authorities were unable to stamp it out until these washing precautions were adopted. This is an interesting fact.”

Whilst the importance of hand washing is thus evident, the writer thinks it is probable that during cholera prevalence in jails using certain forms of latrines, the desirability of like attention to the feet after visiting a latrine should be held in mind. Equally, the particular care of men detailed to remove the vomit and excreta of the *first* and perhaps dubious cases is requisite. The writer has known an epidemic in a jail and a lunatic asylum, respectively, in which what might have proved a more or less solitary case was the cause of an epidemic, by the person removing the vomit and excreta of the first attack contaminating exposed water supplies, not conserved for drinking but used surreptitiously. In both cases, the cholera vibrio was identified and the mode of contamination of the water was clearly proved.

Cases under treatment in hospital in Zanzibar for cholera were not discharged until it was proved that the cholera vibrio was to be found in neither smears nor cultures. “ The longest period in which it was found that vibrios persisted was 21 days.”

### *Philippines.*

In the Philippines, no quarantine for sea-borne traffic was imposed during 1914 against cholera. “ Reliance was placed principally upon the detection of cholera vibrios in the stools of passengers from suspected ports.” Isolation of the sick and disinfection of stools and vomited matters were carried out, and the proper disposal of human excrement in all the towns in which cholera appeared. “ Cholera often appeared in towns in which no connection with the previous cases could possibly be traced, and it was not an infrequent experience to find cholera vibrios among residents of towns in which no cholera appeared later.”†

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\*Annual Report of the Public Health Department, Zanzibar Government for the year 1912, p. 33.

†Annual Report U.S. Public Health Service, 1914. p. 146.

*Age Incidence.*

The following is the distribution, in age periods, of cholera in the epidemic of Zanzibar during 1912 :—

	Oct.	Nov.	Dec.	Total.
1 to 5 years .. ..	..	9	9	18
5 to 10 „ .. ..	..	15	1	16
10 to 20 „ .. ..	1	11	2	14
20 to 30 „ .. ..	10	45	15	70
30 to 40 „ .. ..	3	48	21	72
40 to 50 „ .. ..	6	28	10	44
50 to 60 „ .. ..	4	19	13	36
60 to 70 „ .. ..	..	11	6	17
70 to 80 „ .. ..	3	10	5	18
Over 80 „ .. ..	..	25	11	36
Unknown age .. ..	1	101	..	102
Total.. .. .	28	322	93	443

The following calculation is given as to incidence upon the population of each age in 1,000 attacks in the Madras Sanitary Commissioner's Report for 1895 (para. 103), from which it would appear that the chance of escape of the suckled infant is greater than at other ages :—

Under 1 year of age .. ..	0·3
„ 1-5 .. ..	·6
„ 5-10 .. ..	·6
„ 10-15 .. ..	·5
„ 15-20 .. ..	·6
„ 30-40 .. ..	·6
„ 40-50 .. ..	·7
„ 50-60 .. ..	·8
„ 60 and over .. ..	·5

*Cattle and Cholera.*

Professor W. J. SIMPSON, C.M.G., in his paper “ War and Cholera ” read before the Society of Tropical Medicine and Hygiene\* made the following observations :—

“ But comma bacilli were not confined to the waters of the Hooghly or Tolly's Nullah, or the canal in the suburbs of Calcutta, or to tanks or drains. I had frequently observed a marked coincidence between outbreaks of cholera with diarrhoeal disease among calves in the neighbourhood of tanks. This led us† to examine cows and calves suffering from diarrhoea in the vicinity of cholera outbreaks, with the result that commas were found in the intestines of fatal cases, especially of calves. We also found comma bacilli in the cesspools connected with the cowsheds in which animals were suffering. The exact connection of these commas to cholera in man we had no opportunity of determining.”

\* Trans. Soc. Trop. Med. & Hyg. 1915. Vol. 8. No. 5, p. 148.

† [Haffkine and Simpson.]

The intimate connection of the bulk of the people with cattle, and of the cattle with the water supplies of the people, dictate the desirability of this subject being fully investigated.

## TUBERCULOSIS.

### *Tuberculosis amongst Indians.*

The necessity for contending against tuberculosis as one of the causes of excessive mortality in India has, of late years, received considerable attention from medical officers, and in this direction private philanthropy has been successfully appealed to. It is however far from a recent factor in mortality. Dr. CHANDRA SEKAR, Assistant Professor of Hygiene, Medical College, Madras, has in a paper published in the "South Indian Association Journal" done good service in calling the attention of the people of the Madras Presidency to the increasing, but still incompletely recognized, danger of spread of tuberculosis. In the following interesting introduction to his paper, he shows that the disease was recognised by the Physicians of ancient India :—

"Distinct reference is made to this disease, which is known as Raja Yakshma, in the Hindu Vedas revealed about 3000 B.C. The god of the moon is stated to have suffered from this complaint as the result of a curse for disobedience to his father-in-law, and excessive attachment to his wife, Rohini. Kalidasa (6th Century A.D.) related in the last chapter of his Raghuvamsa that Agnimitra, the last of the line of Raghus, suffered from consumption and died of it. . . . Susruta (4th Century A.D.) calls it the 'Big disease' with many complications and many premonitory symptoms, which is difficult to diagnose, and difficult to treat. He notes loss of appetite, fever, dyspnoea, cough, hæmoptysis, alteration of the voice, drooping of the shoulders, retraction of the chest, fever, burning sensation in the body, diarrhoea, and heaviness in the head amongst the symptoms of this disease. Susruta as well as Madhava advise physicians to avoid the cases with cough, anorexia, fever, diarrhoea, pain in the sides, and alteration of the voice; and the cases with hæmotysis, fever and cough. Both these physicians were aware of the bad prognosis in intestinal and laryngeal tuberculosis, and had a justifiable dread of the cases with hæmoptysis."

In adverting to the prevalence of tuberculosis in Madras City, Dr. Chandra Sekar shows that in a five years' average, 1907-11, there were found tuberculosis lesions in 13.51 per cent. of the total bodies examined in the Madras General Hospital. The disease is by no means one for which the people as yet largely resort to European treatment, but the figures for the hospitals in the Presidency show a steady increase. Thus, in 1901, the Surgeon General's Report shows 7,456 cases of tuberculosis treated, and in 1910 these amounted to nearly 14,000. In the City of Madras, the admissions for treatment amounted to 1,249 in 1910; using a "morbidity factor" based on percentage of the people resorting to hospital Dr. Chandra Sekar considers that the city contains no less than 8,746 cases. He, on these figures, urges energetic action before this pest makes further spread.

The Sanitary Commissioner for Madras in his Inspection Notes of the Madras City for 1894 (W. G. KING) asserted that when registration was better effected, it would probably be found that tuberculosis was an important item in cases classed under "fevers." If the morbidity factor now excogitated by Dr. Chandra Sekar were applied to the

General Hospital admissions at that period there were then only 1,256 cases in the City. There has therefore occurred considerable increase in the interval, showing that Dr. Chandra Sekar's warning deserves attention.

It may be safely said that for many years past it has been customary in all Indian jails to segregate cases of tubercle of the lung, and to treat sputa with full care.\* There is no reason to believe that, in the presence of these special efforts, residence in jail conduces materially to contraction of the disease. Hence, making allowance for the fact that criminals are ordinarily representative of the lower classes of a community, the following figures supplied by the Report of the Sanitary Commissioner with the Government of India for 1913 are of some utility, in showing the probable comparative degree of prevalence of tuberculosis in the various Provinces, and in supporting the action of philanthropists and sanitarians who are pressing the subject upon public notice :—

*Rates per mille of Strength of Admissions and Deaths of Prisoners for Tubercle of Lung during 1913.*

Provinces.	Average strength.	Admissions.	Deaths.
Burma .. .. .	16,748	6·6	4·0
Assam .. .. .	1,672	9·0	2·39
Bengal .. .. .	11,273	12·2	3·10
Bihar and Orissa .. .	6,697	9·1	3·14
United Provinces .. .	21,822	4·4	1·56
Punjab .. .. .	12,906	23·6	5·80
N.W. Frontier Provinces ..	2,008	9·0	1·99
Central Provinces .. .	3,581	7·8	3·07
Bombay .. .. .	9,728	4·0	1·44
Madras .. .. .	9,178	6·6	1·74
Andamans .. .. .	11,541	3·8	3·47
Total in India .. .	108,286	8·6	2·99

*Bovine Tuberculosis in India*

In 1903, in a published communication, the writer reported on this subject to the Government of Madras, as follows :—

“ It is a subject that I have borne in mind for several years in connection with this Presidency ; but although personally of opinion that there must exist tuberculous disease among bovines, I have neither myself nor from enquiries from others been able to secure evidence on this point. . . . In the previous year [1900] I also sent out circulars promising the supply of tuberculin to all medical officers finding suspicious cases, without however obtaining any positive results. Finally, I have before now writing to you asked for the opinion of the Head of the Civil Veterinary Department. He informs me that he ‘ has seen no cases in Madras.’ ”

\* In certain of the Administrations, the question of special Tuberculosis Jails is under consideration. In his Report for 1913 the Inspector General of Prisons, Bengal, Lt.-Col. W. J. BUCHANAN, C.I.E., thus alludes to the subject :—“ The need of a special tuberculosis jail is as urgent as ever, but the prospect of getting it seems as far away as ever.”

In Burma also, in 1908, the Head of the Veterinary Department gave the opinion to the writer that the disease was very rare. There is, however, a concurrence of opinion amongst Veterinary Officers that cases at times are found amongst foreign imported and half-breed animals.

The subject of bovine tuberculosis was, in 1912, investigated in the Bombay Bacteriological Laboratory.\* Tests of 101 samples of milk and of 50 carcasses yielded no signs of tubercle. A qualified Veterinary Inspector, in charge of a slaughter-house in Bombay, is quoted as stating that although 150 animals are daily slaughtered no tuberculosis lesions were found. On the other hand, the Director (Major LISTON, C.I.E.) refers to a "recent experience in Cawnpore, where in 2,000 cattle slaughtered 3 per cent. were stated to have suffered from tubercle." Unfortunately, by whom this experience was gained and whether verified bacterioscopically is not stated.

So far then it would appear that there are large areas in India where bovine tuberculosis is practically unknown. That being so, in the light of the position of bovine tuberculosis assigned to it by the Royal Commission, it would seem most desirable that the full facts as to limitation should be ascertained. The Civil Veterinary Department is being largely expanded and, in certain Provinces, there should be little difficulty in ascertaining precisely where the disease exists, and whether the importation of cattle is sufficiently rare to justify a legal ruling requiring the passing of the tuberculin test.

The peril of spread of bovine tuberculosis in India would be considerable as, although the boiling of milk is with the Hindu a universal procedure, the use of cowdung for smearing floors (according to SHIPLEY a good procedure against fleas) and for certain purification ceremonies (including internal administration to human beings) is commonly pursued. The making of cow dung-cakes for fuel is also universal in rural tracts—the process entailing much handling. The farmer practically lives with his cattle—his desire being that when he wakes from sleep this animal, which means so much to him in agriculture and religion, shall first greet him. Granting then bovine tuberculosis may exhibit itself in lesions in man other than pulmonary, there can be no doubt that check of opportunities of spread of this form of the disease in animals *whilst still rare* would be of great advantage in the interest of both man and beast.

Whilst areas where bovine tuberculosis exists could be recognized, the task of eradication would, in some Provinces, be beset with political pitfalls. An area being proved to be infected, it might be possible by legal measures to prevent transfer of animals. But whatever the extent of public action considered advisable, it is evident that the various societies recently formed for contending with tuberculosis in the human being in India, would be well advised not to omit bovine tuberculosis from consideration.† The proof brought forward by the Bombay Bacteriological Laboratory that the disease is rare is an admirable reason for early action.

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\* Report of the Bombay Bacteriological Laboratory for 1912, p. 25.

† Burma has recently adopted a method that might be expanded for this purpose, and, by placing the matter in the hands of owners of cattle, avoid the "pitfalls" alluded to. Here a "Mutual Insurance Society" undertakes the insurances of cattle, and encourages measures against epizootics which include anti-rinderpest inoculation.

*Race Incidence.*

"The Seventh Report of the British Guiana Society for the Prevention and Treatment of Tuberculosis" shows that its energetic efforts are not undergoing diminution with lapse of time. The local medical staff have given their labour gratuitously, and lady visitors have done much towards feeding necessitous cases and improving the hygiene of their surroundings. The Report affords an analysis of 1,089 patients. The following are the results as to race :—

669	were of the Black race and of these 58 or 8·6 per cent. were tuberculous.
209	" " mixed " " 16 " 7·6 " " "
110	" " East Indian " " 9 " 8·1 " " "
86	" " Portuguese " " 9 " 10·4 " " "
15	" " other races " " 2 " 13·3 " " "

The following is an extract from a Review of pathological records by the Board of Health Laboratory Panama Canal, during the month of May 1914\* :—

"Contrary to the belief that tuberculosis is less common in the Tropics than in other climates, this review shows that the disease is common on the Isthmus, and that it is increasing among the negroes. Its clinical course in these negroes can be better represented by months rather than by years, as is the case in members of the white race. The disease becomes more often widely disseminated in the negro than in the white race.

"Instances of arrested or healed foci in the negro are far less frequent than in the white race. Pulmonary tuberculosis becoming widely disseminated is the common type of the disease in these people. Bone, joint, and cutaneous tuberculosis is far less common among negroes and mestizos of the Isthmus than in the white race. . . . Where permanent colonization of the Tropics takes place and business association brings together the various races, tuberculosis will no doubt be as important an economic factor as it is in the temperate climates."

Passed Assistant Surgeon E. SMEET, U.S.A., writing in the U.S. Public Health Reports of April 23, 1915, gives the following opinion :—

"The Mexicans are possessed of an extremely low racial immunity, which is probably due to the large admixture of Indian blood. Their resistance has never been developed, because they have never fought the infection through successive generations. Just as in children the susceptibility decreases as age increases, so in races the further removed they are from civilization the more susceptible they are to the disease. The type of the infection clearly proves this, for in each of the races cited the process is diffuse, identical to that witnessed in childhood. The soil is of far greater importance than the seed, and an unestablished immunity more to be considered than the presence of consumptives."

*SMALL-POX.*

In Chattanooga, Tennessee, cases of virulent small-pox have been reported.† Up to January 15 of this year there had been 56 cases with a mortality of 28·6 per cent. Most of the cases have been of the

\* Report of the Department of Health of the Panama Canal Zone for May, 1915, p. 8.

† U.S. Public Health Reps., 1915. Jan. 29, p. 328.

haemorrhagic or confluent type. As there is a present day tendency to believe that small-pox as a virulent disease is not found, the following description of one of the cases is reproduced :—

"The patient had been sick three days with initial symptoms of a chill, severe headache, and backache. The attending physician had treated him for influenza. Until the day of his death no eruption had developed, but on the morning of January 15th ecchymoses and petechiae began to appear, and shortly afterwards he had severe hematuria, and died at noon. The body presented no evidence of macular or papular eruption. It was very frankly a case of purpura variolosa."

#### *Bacteria-free vaccine.*

The *Medical Record* (New York) of May 1st, 1915, published a paper by Dr. HIDEYO NOGUCHI, working in the Laboratories of the Rockefeller Institute, in which he proposes a new method of propagating a pure vaccine virus. After referring to the technique at present employed for getting rid of extraneous organisms, he points out that much labour and care could be avoided were it possible to devise a means by which "the virus can be propagated directly free from bacterial contamination." This, he declares, has been realized by transmission of virus which has been subjected to successive inoculations of the testicles of the rabbit. The essential first step is the securing of vaccine "quite free of bacteria."

He considers this can be obtained "... by inoculating the carefully cleansed and shaved skin of the rabbit with glycerinated virus, protecting the vaccinated surface with sterile gauze, collecting the skin vaccine at the height of the eruption, and, spores and spore-bearing bacteria having been thus excluded, emulsifying it in sterile salt solution and treating the emulsion with pure ether or with phenol in appropriate concentration. Non-spore-bearing bacteria may thus be killed without seriously impairing the strength of the virus. Vaccine virus containing bacteria is unsuitable for testicular inoculation, since the inflammation which ensues favours the growth of the bacteria at the expense of the virus."

Vaccine thus prepared multiplies in the testicles of the rabbit much as it does in the skin, and produces typical vaccine vesicles on the human being free of inflammation due to invading bacteria. He however warns that only by successive attempts and selection can there be finally secured a strain that can be transmitted regularly from generation to generation in the rabbit, and that this difficulty is also found in repeated adaptation of the strains to the calf. In the latter case, the testicles of the bull calf are used in the same manner as those of the rabbit. A full account of his experiments is published in the *Journal of Experimental Medicine*. 1915. Vol. 21. No. 6. p. 539.

#### *Tetanus after Vaccination.*

ROSENAU in experiments conducted with glycerinated vaccine stated as to tetanus spores that "very small amounts may remain active for months." Such statements are apt to be interpreted by the public not as a demonstration of the limits of bactericidal action of glycerine, but as an admission that such contamination of vaccine is no uncommon matter. The subject has undergone very careful examination by Dr. JOHN ANDERSON, Director, Hygienic Laboratory U.S.A. Public Health Service. He shows\* that when the rhesus monkey and guinea-pig (both animals susceptible alike to vaccination and to tetanus) have

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\* U.S. Public Health Repts., 1915. July 16, p. 2112.

been experimentally inoculated with anti-small-pox vaccine, "heavily contaminated with the tetanus spores," there resulted the usual course of successful vaccine without symptoms of tetanus. He states that enough vaccine for 2,000,000 persons has passed through the laboratory, and in no case has the organism of tetanus been detected although specially searched for. Enough vaccine has been issued in the United States for 40,000,000 subjects, and as 31,900,000 doses of the issued material were not returned, it is fair to suppose that 31,000,000 were vaccinated with it. In this large number, only 41 authenticated cases of tetanus were found. When the histories of these cases were fully investigated and the date of operation and supervision of tetanus were definitely ascertained, Dr. Anderson found that in tetanus following vaccination "the average period from vaccination to onset of symptoms is 20·7 days while the average mortality is 75·2 per cent." and that this high mortality rate is similar to that in cases of tetanus with an incubation of ten days or less. He then points to the fact that the vaccination scab begins to form on or about the tenth day, and that it was found that in many of the cases the scabs had been prematurely removed. He concludes as follows:—"Cases of tetanus occurring 15 or 20 days subsequent to vaccination do not receive their infection through the vaccine virus, but in all probability the infection is received about the tenth day or later after vaccination. The infection with tetanus is received by a contamination of the vaccination wound, such as may occur in the infection of any other surgical wound not properly cared for." No explanation is afforded by Dr. Anderson as to why in his experiments on monkeys and guinea-pigs, when using vaccine purposely contaminated with tetanus spores, no inimical result followed. Surely here is involved some useful fact connected with glycerine, vaccine or the combination.

#### *Age Incidence.*

A table supplied by Dr. H. C. HIGHET, P.M.O., Siam Government, shows how greatly in a population poorly protected by infantile vaccination small-pox is responsible for deaths of the young and that a diminution of mortality occurs as age advances. It may be safely assumed this has been secured by immunity acquired by attacks of small-pox. The figures supplied are:—

#### *Ages at death from Smallpox.*

Age.	Sex.		Total.	Rate per cent.
	Male.	Female.		
Under 3 months ..	34	32	66	2·7
3 months to 1 year ..	277	293	570	24·0
1 to 5 years .. ..	367	349	716	30·2
5 to 10 " .. ..	120	125	245	10·3
10 to 20 " .. ..	222	132	354	15·0
20 to 25 " .. ..	142	64	206	8·7
25 to 35 " .. ..	125	48	173	7·3
35 to 45 " .. ..	20	6	26	1·0
45 to 55 " .. ..	6	1	7	..
55 to 75 " .. ..	0	1	1	0·5
Unknown .. ..	3	1	4	..
	1316	1052	2368	



*Craw-Craw or Smallpox?*

The following observation is made by Dr. R. H. KENNAN, Senior Medical Officer, Sierra Leone, in his Annual Report on the Medical Department for 1914 :—

“Clinical descriptions have appeared elsewhere of a condition described under the rather makeshift name ‘acute crawleraw.’ Further experience enables little to be added to those descriptions, but has confirmed the view that it is important from the public health point of view that the condition should be more widely known and recognised. Successful vaccination up to the end of the second day of the rash is possible in some cases of smallpox, but after that time it is not known that vaccination has been successful within a period measured by years. In ‘acute crawleraw’ cases, however, which have not been previously vaccinated, vaccination ‘takes’ normally at any time. The test of course will not distinguish between ‘acute crawleraw’ and varicella, but the differential diagnosis between these two is of minor importance. It is suggested that all cases diagnosed as sporadic discrete small-pox or suspected of being such, should be tested by vaccination.”\*

## WATER

*Emergency Disinfection of Water.*

Permanganate of potash, which has been largely trusted to for disinfection of water supplies in cholera epidemics, is just now very expensive and an official substitute is desirable. In the various expeditions in the tropics by our troops, the question of rapid purification of water against water-borne diseases must also have, at the present time, special significance.

The use of lime hypochlorite for water disinfection has long been practised. In America, 600 cities employ it in their water works as a routine measure. Its mutability, especially under tropical conditions, is, however, an impediment to its extensive use. Captain J. J. HARPER NELSON, I.M.S. in the *British Medical Journal* (1915, May 8th) has advocated a method for generating chlorine gas, as required, by using apparatus that he considers is readily portable, and he shows how useful the method has been in practice. On the other hand, Captain NESFIELD, I.M.S., who has long given attention to modes of chemical purification of water, in the *R.A.M.C. Journal* (February, 1915), calls attention to liquified chlorine as a useful agent. He states :—“I have had ten chlorine cylinders with me for the last nine years in India; they have travelled many thousands of miles by rail and road without an accident. The cylinders I recommend contain 10 lb. of liquid Cl, weigh about 20 lb., and stand 3 feet high on their own base.” Major LELEAN, R.A.M.C., in his admirable work “Sanitation in War” states as follows :—“The use of chlorine led to various suggestions which have been aptly described as ‘fantastic.’ One was the use of metal cylinders of the compressed gas. . . . Such proposals need but be mentioned to be dismissed as impracticable in the field.” Major Lelean would apparently consider for service reasons chlorinated lime as preferable. However this may be, it is evident that Captain Nesfield’s evidence as to cylinders kept with him nine years in a tropical

\* “Annual Medical Report for 1909 and Annals of Tropical Medicine, 1910, Mar. Vol. 3. No. 5.”

climate, and subjected to the risks of transport by rail and road many thousand miles, should go to show absence of corrosion and sufficient strength to withstand shocks. As usually sold and accepted for shipment (the latter being a good test of opinion as to safety) the cylinders are 52 inches in height and contain 100 lb. liquid chlorine. The gross weight is 185 lb., and therefore within the load of a pack horse. Simple attachments permit of control of flow of the gas.

The writer suggests that it is probable there is scope for use of both hypochlorite of lime and liquified chlorine. The doling out of the hypochlorite might be convenient in treating the contents of such receptacles as water carts, or small sources of water supply at numerous separate localities, in areas where the securing of fresh quantities of this chemical is feasible; but when distance, facility of transport and large water-supplies are factors, the liquid chlorine should have distinct advantages.

In a paper read before the American Water Works Association by Francis D. WEST, Chemist, Torresdale Laboratories\*, both the advantages and disadvantages of liquid chlorine as against chlorinated lime are set forth. It is held that liquid chlorine will retain its full efficiency over unlimited time, whereas hypochlorite of lime deteriorates; that the floor space for storage of material for the latter method is greater than for the former; that the amount of hypochlorite that will give a taste to water may be estimated at from 20 lb. per million gallons; that the average figure will be from 10 lb. to 12 lb.; this would mean 2 lb. of liquid chlorine; that a heavy over-dose can be given without complaint; that the feed of liquid chlorine is more uniform than with the hypochlorite process; that in general the cost of the two processes should be about equal; if anything liquid chlorine should be cheaper.

The following are the objections to liquid chlorine:—"The chief objection to the use of liquid chlorine lies in the concentrated energy of the material itself. If liquid chlorine is set free in small enclosures, it will cause nausea. With ordinary common sense and judgment on the part of the operator this is not likely to happen. The greatest danger lies in faulty cylinders and faulty valves. If the cylinder valve will not turn off or if the cylinder leaks it must be got out to the open air and the chlorine allowed to escape."

Careful inspections of cylinders and valves must be made. Liquid chlorine when it comes in contact with moisture has a very corrosive action, but this has been overcome by the use of hard-rubber pipes and towers. Mr. West concludes his paper as follows:—

"While in some instances liquid chlorine may prove more costly than chloride of lime, the regularity with which it can be applied, its more effective action on pathogenic bacteria, the small compact apparatus and the absence of the odour of chlorine around the plant recommend it as a satisfactory substitute for hypochlorite, having, as it does, all the advantages of the latter and only some of the faults."

#### *Emergency Lime Hypochlorite Apparatus.*

Perhaps the most readily adaptable machinery for disinfection of water by hypochlorite of lime is that prescribed by the Ontario Provincial Board of Health. They advise as a method readily understood

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\* Engineering Record. 1914. May 23, p. 584.

by the people, a teacup to be filled with lime hypochlorite and this amount to be mixed with three teacupfuls of water. One teaspoonful of this mixture is to be added to each two gallons of water to be treated, the water to be allowed to stand ten minutes before use.

But the Minnesota State Board of Health have devised a simple and readily portable apparatus for dealing with a public water supply of 1,000,000 to 4,000,000 gallons per day.\* It is assumed that at the locality concerned there can be obtained three sound 50 gallon barrels. The entire apparatus which is used in conjunction with the barrel can be placed in a trunk for shipment. The articles to be conveyed are :—

“One chemical feed box, one float valve, one control valve, one collapsible mixing device, four  $\frac{1}{2}$ -inch brass grate valves, eleven  $\frac{1}{2}$  by 3-inch iron nipples, two  $\frac{1}{2}$ -inch iron tees, 12 feet of  $\frac{3}{4}$ -inch rubber garden hose, and one 10-pound can of calcium hypochlorite, or ‘bleach.’ This constitutes the entire equipment necessary to set up the plant and put it into operation, exclusive of the barrels and stand. The weight of the trunk and contents complete is 67 pounds.”

For field service there is added to this equipment portable bacteriological and chemical outfit packed in neat portable trunks, bringing the entire weight up to 162 lb.

#### *Ultra-Violet Rays.*

*Indian Engineering*† (Calcutta) in an article referring to a paper in the Journal of the Franklin Institute gives the following results of experiments with ultra-violet rays :—

“ . . . In testing the comparative effect on different kinds of germs, it appeared that their resistivity did not vary so much under the action of ultra-violet rays as under the action of either heat or disinfectants. . . . The abiotic action of a mercury vapour lamp is independent of the temperature between zero and 55° C., beyond which the power increases greatly with lamp temperature ; in other words, a lamp sends out more ultra-violet rays the hotter it is ; but care has to be taken not to raise the temperature unduly, because then the quartz becomes opaque and the passing of the rays is seriously interfered with. As an approximate result arrived at by experiment, it may be stated that the luminous tube of the lamp will not absorb more than 25 per cent. of the ultra-violet light after 3,000 hours, if run at a temperature not exceeding about 700° C. If run above 800° C. the tube becomes very opaque to the rays. Considering next the water under treatment, it is necessary for it to be free from suspended and colloidal matter, that is to say, it must be clear to enable the rays to traverse it. If quite clear it is as permeable by the rays as air is. . . . At Luneville, France, is an installation with a ten-lamp canal which has practically banished typhoid from the city, and there are now several large plants of the same type under construction in the country. The energy required is found to vary between 50 and 130 units per million gallons of water, allowing for very large safety co-efficients.”

Having regard to the necessity of rendering the water clear in the first place, it is not likely that ultra-violet rays can be of much utility under war conditions, except at a base. In the Morocco campaign, however, a portable equipment consisting of a water pump, filter and gasoline motor generator was placed on a gun carriage. “In the field hospital where it was used not one case of hospital infection broke out, nor was there a single case of typhoid or dysentery.”‡

\* U.S. Public Health Repts., 1915, Feb. 26, p. 616.

† 1915. Feb. 13, p. 103.

‡ Engineering Record, 1913, August 2, p. 121.

*Search for Potable Waters.*

The following extract enforces the necessity for a careful weighing of all facts as to physical formation of areas and of soil and subsoil conditions, to enable any judgment to be arrived at as to selection of subsoil sources of water supply. The finding of a fresh water supply at small depths within the area of wave action on a coast, incident to certain physical conditions, is by no means unknown elsewhere. Dr. McHATTIE thus states the result of what must have implied much laborious work by him :—

“ In forming an opinion as to the purity of the well water little weight has been given to the Chlorine figure which in many cases is extraordinarily high owing probably to the presence of pockets of salt in the rock. An attempt was made to find the normal chlorine content of the wells in a given district which might be taken as a standard but the variations proved to be quite bewildering. The chlorine content of 50 wells, all within an area of roughly half of a mile in length and two hundred yards in breadth, showed variations ranging from 12 to as much as 290 parts per 100,000. The chlorine figures for four of these wells, all apparently similar and subject to similar influences, within less than fifty yards of one another were respectively 205, 85, 62, 50. These variations are of considerable interest and are of great importance in relation to water supply as it seems almost impossible to foretell whether any given boring will yield fresh or brackish water. It is a remarkable fact that in certain places the freshest water is to be obtained practically on the sea shore, as is the case at Harbour Island.”\*

*Bacterial Standards of Water Purity.*

In his work on the Bacteriology of Surface Water in the Tropics Major CLEMESHA, I.M.S., has made a good case for the necessity of recognizing the particular kinds of faecal bacteria as contrasted with groups, as a guide to recent and remote contamination of water. On this subject,† Major McCOMBIE YOUNG, I.M.S., (in collaboration with Asst. Surgeon RAM TARAN SEN, L.M.S.), makes the following remarks, consequent upon his examination of a water supply which he holds was “ neither polluted nor pollutable ” :—

“ The conclusions at which we arrive from weighing these facts are that the presence in water of Bacillus No. 7, B. Grimthal, B. Coscoroba, B. Cloacae, B. No. 109, and, with a less degree of certainty, of B. No. 36, has no reference to pollution or even to a remote pollution, as in this case they appear to be normal constituents of an unpolluted water. These organisms cannot be derived from the faeces of birds, as there is no means of access for birds in the enclosures of the springs. Whether they come from the gut of earth-dwelling insects, such as grubs or earth-worms, is hardly worth discussing. We therefore suggest that these organisms may be allowed to leave our court acquitted of the charge of being at any time implicated in the pollution of water.

“ With all due deference to Major Clemesha's opinion in this connection, we would suggest that this series of analyses raises the question whether these organisms are not present in faeces because they are at first present in water, and not *vice versa*.”

Major McCombie Young gives grounds for believing that the artificial protection of the spring he refers to is complete, and then

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\* Annual Report of Superintendent, Resident Surgeon and Matron of Bahamas General Hospital for 1914, p. 11.

† Supplement to the Sanitary Report of Assam for 1913, p. 38.

shows that for the water to reach its present point of discharge it must pass from a plateau which forms its collecting ground above Shillong, "through a minimum vertical distance of 700 ft. of rock and most of it obviously passes diagonally through about 1,000 ft. of rock before emerging. The catchment area of the water bearing stratum is devoid of human habitation and consists of reserved forests and open grass downs on which a few cattle are pastured."

The writer suggests that in the absence of a description of the nature of the rock and of a complete sanitary survey of the plateau, the statement that water probably passes *through* (implying that the passage is chiefly by pressure) rock does not suffice to prove that 500 or even 1,000 ft. travel deprives water of its contained organisms. Nor, indeed, without definition as to the nature of the rock, would it be safe to predict that the particular spring tested was derived wholly from the plateau in question. Under certain conditions of rock and soil distribution, artificial or natural, on a plateau as described, it might be possible to find a pool to which cattle resort and in which their herdsmen perform ablutions where the use of a little fluorescene might help to supply missing details.

The Kasi and Juntia Hills, of which the Shillong site is a continuation, are of complex structure. There occur "metamorphic rock, gneiss, micaceous slate and quartz rock which have become greatly altered, disturbed and contorted" by the granite which they overlay. The Assam District Gazeteer treating of the Shillong site refers to "enormous deposits of limestone on the face of the hills." Irrespective of the fact that Shillong in 1897 was subjected to earthquakes which may have produced disturbance, there is room for suspicion that the normal rock formation is not such as to preclude the possibility of water passing through fissures and, in the case of the limestone rock, through routes which may have been formed by water contact.

## FOOD.

### *Jail Diets.*

In the Madras Presidency, the death-rate in a total jail population varying from 13,340 to 11,400 has shown steady improvement from 1909 to 1913 thus:—23·2; 14·5; 13·5; 11·6; 7·9 per mille. The last rate is pointed to as a record figure with justifiable satisfaction by the Inspector General of Prisons (Lt. Col. MACNAMARA, I.M.S.). In discussing the causes of improvement, he is disposed to assign it chiefly to the use of diet founded on the principles ably laid down by Major McCAY, I.M.S.\*:—

"As to how these improvements in the sick and death-rates were brought about, the causes are without question many. To begin with, the year past was, I believe, a fairly healthy one outside as well as inside jail walls, but setting aside this cause of variation, a large share of the improvement is, I think it will be conceded, due to causes operating solely within the department. We have improved in our sanitation generally, in our drainage, in our kitchens, in ventilation, in our latrines and in our methods of handling and distributing food, and last but not perhaps least, in having

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\* Report on the Administration of the Jails of the Madras Presidency. 1913, p. 13.

introduced a more health-maintaining dietary. It is not possible to apportion the degree of success attained to each particular innovation, nor is it necessary; suffice it to say that the results for the year show that they justify the measures taken. Last year was the first year that the new diet was in force throughout, in all jails and it is significant that it also should be the year, when for the first time, the mortality rate in the jails of this Presidency (or elsewhere) has fallen to single figures. That the new diet has been beneficial, will appear further on when the great reduction in bowel diseases comes under notice, because improvement is more likely to manifest itself in this direction under an appropriate diet than under any other class of disease. It is to be noted that the better state of health in 1913 was very general in almost all jails, which fact in itself would point to a common cause acting through them all."

At p. 6 he further explains the rôle of the new dietary :—

"The value of the new diet scales, from the chemical standpoint, is not improved by the change from ragi to rice, but whatever value they possess is due to the fact that the total quantity of food has been reduced in both dietaries and, the nutritive properties are now better proportioned than they used to be. This naturally has led to a better all round state of health and (what to the uninitiated is perhaps paradoxical) to an improvement in body weight. Both experiment and observation show that weight can go up, by reducing a diet that is unnecessarily large and badly adjusted and it has been demonstrated that by increasing the cereal grain in a diet beyond a certain and economical quantity (the dal remaining constant), the result is that less nitrogen is absorbed both relatively and absolutely."

When, however, the proof of increased weight with reduced cereal diet is sought for (p. 16) it is not forthcoming :—

"Of the total number of convicts discharged during the year, 63·60 per cent. gained weight as compared with 68·55 in the preceding year. The proportion of prisoners who lost weight went up from 18·65 in 1912 to 20·29 per cent. in 1913, but the latter figure is not large. These variations are what might be expected from one year to another, and provided they are not considerable, are of no serious import."

Also whilst regarding a reduction of bowel affections as due to the revised rations, he makes the following important admissions :—

"Dysentery seems to pick out the jails where the kitchens are defective, and flies are allowed more access to food than they ought to be. With the advent of better kitchens and more suitable latrine arrangements, the disease should decline. . . . Many minor improvements were made in our kitchens and cooking apparatus during the year and, I believe, to these are to be attributed in no small degree the better health enjoyed, especially as regards reductions in bowel diseases. The present cry, is new and fly-proof kitchens everywhere. Already we have a number of them and others are projected."

Nevertheless, the coincidence of the reduced dietary with the reduced mortality rate is so marked and the problem is of such importance that it would be desirable to defer judgment, till further discrimination of factors concerned is forthcoming. Lt. Col. MacNamara's huge experiment must at least establish some great truths in dietetics. This is the attitude assumed in the matter as concerns the Bengal Jails, by Lt. Col. W. J. BUCHANAN, C.I.E., Inspector General of Prisons :—

"I am in complete agreement with the conclusions so thoroughly worked out and arrived at in Major McCay's report, but theory and practice do not always agree. I have tried on a large scale Major McCay's diet, part rice and part wheat-atta, and I am sorry to say that though physiologically superior it is not popular; it does not give the desired feeling of repletion and *bien être*, it being less bulky. . . . It is becoming more in use, especially in western districts, but is certainly not popular. I still maintain we should go slowly; the dietetic habits of a community can only be wisely changed slowly."

On the scale against the influence of the revised diet being so largely responsible, must be placed the fact that the progressive decrease in mortality was very marked before the adoption of the dietary, namely, a reduction in 1910 to 14·5 per mille from 23·2 per mille in the previous year and, as shown by the remaining figures quoted above, the improvement was progressive. The fall to 11·6 in 1912 must be discounted by releases in 1911, in honour of the King's Delhi Durbar. Superintendents, if choice were allowed, would have largely advised release of the feeble. The decrease of the population from 13,340 in 1909 to 11,400 in 1913 also could not fail to have influence in the matter of the "air ration" per head. The admitted improvement under "all causes" of mortality, in any case, brings into prominence the fact that increased resistance to diseases brought about by suitable dietary is a somewhat different question to abolition of agencies for their conveyance.

Indeed, the factor of prevention of disease is brought into relief, as contrasted with improved resistance of a body of men, if it be stated that, in the Bihar and Orissa Jails (certain of which are not in structure ideal), there is employed a diet\* more nearly fulfilling McCAY's requirements. Here the mortality was from 1911 to 1913, 19·1, 17·5 and 19·6 per mille. Again, the diet of the Burma jails by no means meets McCAY's requirements; yet during tenure of office by the late Col. FRENCHMAN, C.I.E., the mortality in 1906 to 1908 inclusive was, in an average strength of 12,926, 13·96; 11·38; 13·14 per mille. Under his administration, kitchens were well protected from flies, all diarrhoea and dysenteric patients were segregated, their clothing disinfected, and their stools separately collected and incinerated. Quinine prophylaxis was systematic. Unless the trace of animal food and possible phosphatic compounds in the form of ngapi† (half oz. per diem) be of more importance than ascertained, the distinguishing feature in this diet is the absence of animal diet and liberality of vegetables; and instead of using one form of dhal (lentils) "ringing the changes" with various beans. In allowing 10 oz. of vegetables against 6 oz. permitted in Indian Jails, in the writer's opinion, the Burman derives an important advantage, as the Indian Jail allowance is so small that seasonal variation in nature of supply becomes of serious importance; so much so that he believes the first stage of falling off in health and weight of prisoners may frequently be traced to this cause. The faecal mass of Burman prisoners however‡ supports McCAY's contentions as to bulk of waste material. The following is the hard labour diet employed in the Burma Jails during the period mentioned:—

Rice 24 oz., husked and winnowed.	Condiments $\frac{1}{8}$ oz.
Dal or beans 4 oz.	Gnapi $\frac{1}{2}$ oz.
Vegetables 10 oz.	Salt $\frac{1}{4}$ oz.
Oil $\frac{1}{2}$ oz.	

\* Rice 12 oz., wheat 10 oz., per diem. Dal 6 oz., vegetables 6 oz. [Salt, condiments and oil are also issued daily, and antiscorbutics under a special rule.]

†A paste of fish which has been salted and subjected in bulk to a long process of compression.

‡Footnote, p. 476 of this *Bulletin*, Sanitation Number, June 15, 1915.

The right proportioning of diet by McCAY's method is largely of economic value. He shows that with less labour to the digestive organs, and with less bulk, not entailing wasteful excretion of nitrogen, a diet consistent with well-being could be formed that would cost less than has been adopted. Thus, he reckoned that, on the principles laid down by him, "on a basis of 16,000 prisoners in Bengal, from rice alone a saving of over three-quarters of a lac of rupees yearly would result."\*

It is evident from the results secured in the Madras prisons, however, that whilst this saving may be possible in Bengal on a single article of diet, adaptation to local conditions elsewhere is an essential if successful economy is to be secured. The Madras Jail statistics fail to show economy by use of the revised dietary, as the total cost has increased from Rs. 35. 0. 9 per head per annum to Rs. 38. 7. 0. This, however is probably largely due to an Order issued by the Government making a distinction between rice and dry grain eaters—a matter chiefly of sentiment. Even sentiment, however, does not cover the fact that the rice is purchased ready milled, instead of as paddy to be pounded by jail labour. It ought to be possible to disentangle the items, and arrive at a clear understanding as to the financial economy of McCAY's suggestion.

In any case, the adjustment of McCAY's dietary to the Madras Presidency would not require the use of rice for the ordinary hard labour prisoner—derived from a population five-sixths of which (CORNISH) use dry grains as the staple article of diet.

As the question of dietaries in jails for Indians and natives has recently attracted attention in certain of our African Colonies, the revised scale of diet used during 1913 in Madras is given in detail :—

	Ounces daily.	Ounces weekly.
Cereal—		
† { Ragi (a) .. .. .	15	105
† { Cholam or (b) .. .. .	15	105
† { Cumbu (c) .. .. .	15	109
Rice .. .. .	5	35
Pulse (dhall) .. .. .	‡5	35
Vegetables .. .. .	6	42
Oil .. .. .	$\frac{1}{2}$	$3\frac{1}{2}$
Tamarind .. .. .	$\frac{1}{2}$	$3\frac{1}{2}$
Salt .. .. .	$\frac{3}{4}$	$5\frac{1}{4}$
Curry powder .. .. .	$\frac{1}{4}$	1
Onions .. .. .	$\frac{1}{2}$	$3\frac{1}{2}$

Note (1) 26 oz. of cumbu to be considered as equivalent to 25 oz. of ragi or cholam.

(2) Convict warders are given 20 oz. of rice daily instead of 20 oz. of mixed grains.

As the Madras male adult Indian in free life is accustomed to use about 24–26 oz. of dry grain as the foundation of his daily diet, it is

\* One lakh at 1s. 4d. per rupee = £6,666.

† For definition of these grains see succeeding Note "Famine Diets."\*

‡ 2 oz. of which may be replaced thrice a week by 2 oz. of smoked or dried fish or 4 oz. of fresh fish.



obvious that in the matter of quantity (as remarked by Col. W. J. BUCHANAN, in the case of Bengal) there will result a feeling of vacuum in the interior economy of prisoners, which it will be difficult to persuade them is not akin to punitive measures.

#### *Famine Diets.*

It will be seen that in a foot note attached to the diet scale quoted in the preceding note the difference (chemically) in nutritive value of (c) cumbu (*Penicillaria spicata*), (a) ragi (*Eleusine coracana*), and (b) cholom (*Sorghum vulgare*) is allowed for. This method might have been carried further in differentiating the value of cholom and ragi—more especially in the apparently better digestibility of the former, and the difficulty of getting rid of a reasonable proportion of the husk in the latter. In diets regulated so as to ensure a correct proportion of constituents this may matter little, but the whole question of the comparative value of grain becomes of supreme importance under famine conditions. This is a matter where work such as fulfilled by McCAY could be continued with benefit both to the saving of life and funds in India. Famine conditions contemplate the exaction of labour suited to physical abilities, and the giving of wages that will obtain a certain amount of food at market prices based on grain. The amount over and above the bare grain, for condiments, legumes and vegetables, even if sufficient, is not likely to be applied in correct proportion by the labourer in the absence of the necessary "kultur." Those earning a small wage more especially will commit the sin against which McCAY protests, of filling the vacuum by a useless proportion of carbonaceous matter. Nevertheless, the Famine Code Rules lay down a certain weight of grain without differentiation of its nutritive value *so long as it is in common use in localities*, with the result that whilst in one part of India the famine labourer readily is kept in sound health in another, on the same allowance of grain, this is not feasible.

The following contrast of one of the Famine Code diets with different grains as a basis will illustrate that it is possible in localities using wheat to adopt the lowest scale of famine diet, and yet secure for the people almost as good nutrition as if employing a much higher scale. In this manner authorities responsible for famine administration in one part of India may be capable of using a low diet and exacting labour such as is impossible in another.

#### D. Diet = 16 oz. grain.

When wheat is used.				When cholom is used.				When ragi is used.			
Albuminoids.	Starch.	Oil.	Starch equivalents.	Albuminoids.	Starch	Oil.	Starch equivalents.	Albuminoids.	Starch.	Oil.	Starch equivalents.
Oz.											
2·615	12·191	0·567	13·495	1·943	12·815	0·695	14·413	1·623	12·959	0·615	14·373

*Protection of Food.*

In Colon, during 1914, "Retail stores . . . were required to keep bread in glass cases. The proper wrapping of bread sold was made the object of special effort. Such vendors of food products were required to use glass cases. Some 300 or more glass cases for bread and cooked food were installed in shops in Colon. Fruit stands were made to protect those fruits requiring it with glass cases."\*

\* Report of the Department of Health of the Panama Canal, 1914. p. 19.

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## SANITARY RULINGS.

## COMPULSORY VACCINATION IN SIAM.

Dr. HIGHET, Principal Medical Officer, Local Government, Siam, has written a brochure describing the progress of efforts against smallpox in Siam, culminating in the passing in 1914 of an Act by the Government of that country requiring compulsory vaccination.

He shows that smallpox, so far as Hospital returns permit of judging, is of a deadly type ; as, in a total of 379 cases observed, the death-rate was 55·9 per cent. In 1911–12 the mortality from the disease amounted to 4·3 per mille of the population.

The people have been accustomed to the use of inoculation against smallpox since 1838, when it was introduced by Dr. BRADLEY, an American missionary. It has been difficult to induce them to give up this method in favour of vaccination.

Efforts largely promoted by the private benevolence of H.M. the King of Siam have been made to advance vaccination and, as the campaign thus inaugurated has been received with favour by the people, it was thought that the time was now ripe to secure a diminution of the marked mortality from smallpox, by the introduction of a Compulsory Vaccination Act.

Dr. Highet says, "the basal idea is the desire to have every person now in the Kingdom, or who may enter the Kingdom, rendered immune to smallpox ; therefore, as soon as this law comes into force, every person who has not previously been successfully vaccinated must become vaccinated, unless it can be shown by a certificate from a duly qualified Public Vaccinator that he or she has previously suffered from smallpox or has been repeatedly vaccinated without a successful result." As to age for vaccination the parent is responsible that the operation be performed on a child after one month of age ; but no time limit is laid down. The people are apparently, in view of this order, expected to take advantage of the visits of the Vaccinators deputed by the Superintendent of Vaccination in any District. The object subserved is to secure that vaccination shall be chiefly conducted in the cooler months of the year ; although Dr. Highet considers this not essential as "nowadays, with railway communication, ice and thermos flasks, efficient vaccine lymph can be transported to almost every corner of the country at any time during the year."

It is required that a child which has been vaccinated be brought for inspection on the 8th day ; a certificate showing result of vaccination is then granted. In the event of an area being imminently threatened with small pox, it is provided that by notification the Minister can demand vaccination or revaccination of *all* the inhabitants of the area concerned within a specified time. Dr. Highet trusts that an addition will be made to this clause of the Act, by its being definitely laid down that revaccination during the ninth year will be compulsory. Postponement of vaccination on account of sickness of a child is arranged for.

Vaccination at appointed stations is rendered free. If the public vaccinator attends private houses, a fee, at a rate prescribed by the Minister, is laid down. Private medical practitioners may undertake vaccination ; but if they desire their certificates to be recognised for

the purpose of the Vaccination Act they are required to "take out licences as public vaccinators." No unqualified person will be recognised as a Public Vaccinator ; and the lymph to be used must only be that which has been authorised by the Minister. Persons inoculating with small pox virus incur heavy penalties.

As a preliminary to the passing of the Act, a Serum and Vaccine Laboratory was opened in 1906, and by 1912 a Pasteur Institute was merged with it "under the immediate supervision of Drs. MANAUD and ROBERT—"both of whom have been trained in the Pasteur Institute at Paris."

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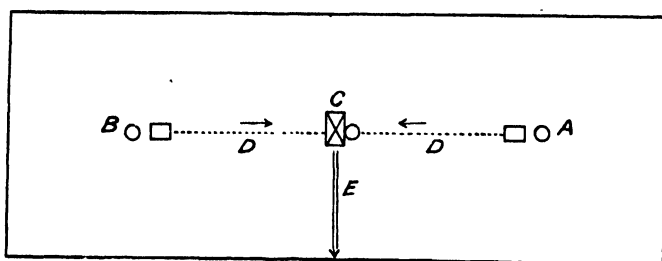
## SANITARY WORKS.

## THE TRANSPORT OF EXCRETA.

When pit filters attached to latrines worked on the separation system cannot be safely employed, the removal by cart of urine, washings, etc., after pumping from cesspools would bespeak heavy expenditure. Presuming however the night soil depot is distant from the town served, it would be a much less expensive matter to treat these fluids close to the town than convey them to the night soil depot—the choice of a distant site for which recognises the necessity for freedom from flies in the inhabited area, the slow conversion of night soil by the process of nitrification, or the (ordinarily) hopelessly expensive method of incineration. It should be possible to secure for certain areas of the town served sufficiently secluded spots where the fluids can be passed through rough aerobic filters\* and the filtrate be applied direct to soil, or be sent by drains elsewhere after such treatment.

As an alternative to this method, it might often be convenient to arrange, in or near the town, a depot where urine could be received and, in cases where pails contents are transferred, the washings of latrine pans. From a well ventilated impervious cesspool a pump worked by animal power, or by an oil engine, according to duty expected, could lift the urine and washings and deliver them by a main of *small calibre* to any suitable distant ground or filter area for disposal.

Indeed, where the separate system is only partially adopted, there is no reason why by imitating the Berlier method (in so far as the use of small pipes is concerned) a considerable amount of faecal matter should not also be sent daily by the same delivery main, instead of by carts. The attached diagram shows arrangements on this principle



A B = Night-soil dumping depots with water supply.

C = Sump with power for lifting sewage and night-soil dumping depot combined.

D D = Sewers.

E = Main delivering sewage to farm or sewage treatment works.

The outline marks the boundary of inhabited area.

for villages (such as often found by rivers and the sea) having greater length than breadth. At A and B are night soil dumping depots. Each has a screen and dolly for comminuting hard faeces, and a well

\* Plan C. this *Bulletin* (Sanitation Number) Vol. 4, No. 8.

(or other water source) from which water is lifted by pump to a cistern. From this cistern, water is supplied in measured proportion for flushing night soil, urine and pan washings through Sewers D D into a central sewage sump C, whence the total mixture is pumped to a farm or sewage works for treatment.

Transport to the distant night soil depot would demand cartage for .234 tons of faeces per thousand of the population of vegetable eaters, against 1.35 tons of both urine and faeces transported together. As there is a daily load, there is room for economy in case of transport and staff (according as the separate system is more or less complete) by adopting, if not the methods, at least the principles suggested above. Estimates worked out in detail, under the writer's supervision, show that economy in working well warrants the initial charges of such schemes.

#### THE TRANSITION STAGES FROM NIGHT SOIL CONSERVANCY TO SEWERAGE AND WATER CARRIAGE.

The undertaking of schemes for towns piecemeal is ordinarily, from financial, sanitary and engineering aspects, erroneous. But, an exception to this rule can be found where a plant will at once relieve a town undergoing rapid expansion (such as follows increase of trade) of the night soil conservancy difficulty in respect to recurring increments of cost of transport, and, later, of the sullage trouble and, yet, ultimately may form an integral part of a complete sewerage scheme. The writer believes that in towns in the tropics not blessed with good gradients, or surplus funds, this dovetailing of the requirements of finance and sanitation *pari passu* with increase of population and its prosperity, can be well subserved by the Shone system.

Its rôle in complete sewerage schemes is of course well established. But although the capability of the Shone ejector in dealing with sludge is well recognised, it is not ordinarily known that it is perfectly capable also of lifting night soil plus urine of a population, *without any added water*.

A good example of this is to be found at Warrington, England. Here it is essential, to secure economical treatment of the night soil for the production of manure, that it shall reach the vacuum pans as free of moisture as possible. Consequently, not even the washings of night soil receptacles are allowed to be dumped into the ejector. The urine and excreta are received upon a coarse grid, and are hand-raked through it. Rarely, special extraneous matter is treated by dolly.

The population of Warrington is 72,000. Each week, 15,168 receptacles are emptied into an ejector. Under air pressure, from this the urine and faeces are forced to the depot for manufacture of manure by the fixed ammonia method. The manure sells at a remunerative price (£5-£5 10s.). All evaporation of moisture is effected by heat derived from incineration of town rubbish. The depot is  $1\frac{1}{2}$  miles distant from the ejector, and is 72 feet above its ground level. The material is sent forward at the rate of about 3 feet per second. The air compression station is about three quarters of a mile from the ejector. In 1901, the delivery main had been in use for nineteen years, and was then reported as "clean as polished steel," showing that no accretions

had occurred. In that year the writer, when inspecting the Warrington arrangements, was told by the late Mr. LONGDIN, the then Surveyor of the Borough, that the ejector for night soil had not cost more than £5 for repair during the whole period of use.

These works still perform duty, and fairly establish the fact that faecal matter and urine of a population can be transmitted by pipe to a distant night soil depot (if necessary considerably above the level of the dumping depot) *without added water*. The point is of importance because there are localities in the tropics where, at times of drought, water is so precious that the risk of scarcity would put any system of pipe transmission of faecal water out of the question with local authorities, unless convincing evidence were available.\*

Having determined to use a Shone ejector for receipt of faeces and urine delivered at a depot within a town by the usual means of transport and thus to secure transmission to any distant point for disposal, there is no reason why, as the next step in progress, whilst a public and private latrine system is still pursued in parts of the town, sullage water of the locality in the neighbourhood of the ejector site should not also be received, by the laying down of drains from houses in the vicinity or from particular streets. In this way, by adding ejectors at intervals, according to financial possibilities, area after area of a town may be brought under successive systems of simple excreta removal, sullage removal and, ultimately, these so combined as to secure complete sewerage and its complement—water carriage of night soil.

As air pipes can be extended in any direction, there need be no increase of machinery for air compression coincident with the stages of advance indicated. Whether or not the machinery of the air compression station should, at first, be equal to the task of the present or future requirements, would depend upon the scope of ambition and funds. But it is satisfactory to know that air compression in the present day can be carried out cheaply by the use of power derived from kerosene oil engines, a matter which bespeaks economy in fuel and (when contrasted with the use of steam) in the grade of skilled staff required at the central station.

It may be stated that the system of gradual change from solely night soil conservancy in certain areas to complete sewerage by the Shone system was that followed in Rangoon.

Having become possessed of power in the form of compressed air, the tropical town in process of expansion might well find an additional rôle of usefulness for the central machinery in lifting deep well water

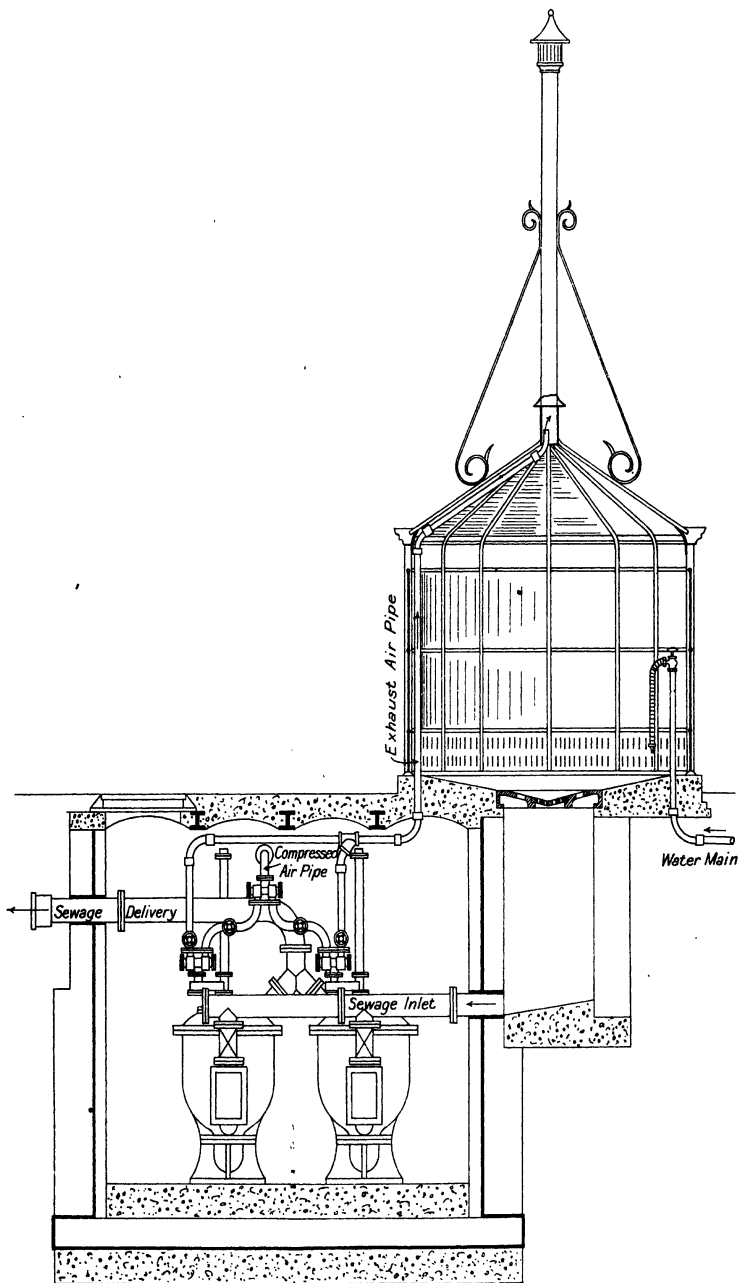
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\*Close to the spot where night soil is dumped into the ejector at Warrington is a grid through which the washings of the receptacles pass *direct* to the neighbouring sewers, and visitors to the works at times have left with the impression that this fluid is used to dilute the faecal matter. To meet such objections, the writer is able to furnish the following extract from a note kindly furnished by Mr. A. M. KER, A.M.I.C.E., the present Borough Surveyor :—"The pail contents are ejected without any added water, as there is sufficient urine in the pails to make the faeces sufficiently liquid to be dealt with by the ejector. If it were found necessary to add water, the cost of the manufacture of the manure would be greatly increased as after treatment as much water is driven off from the residue as possible o as to leave the manure as dry as possible."

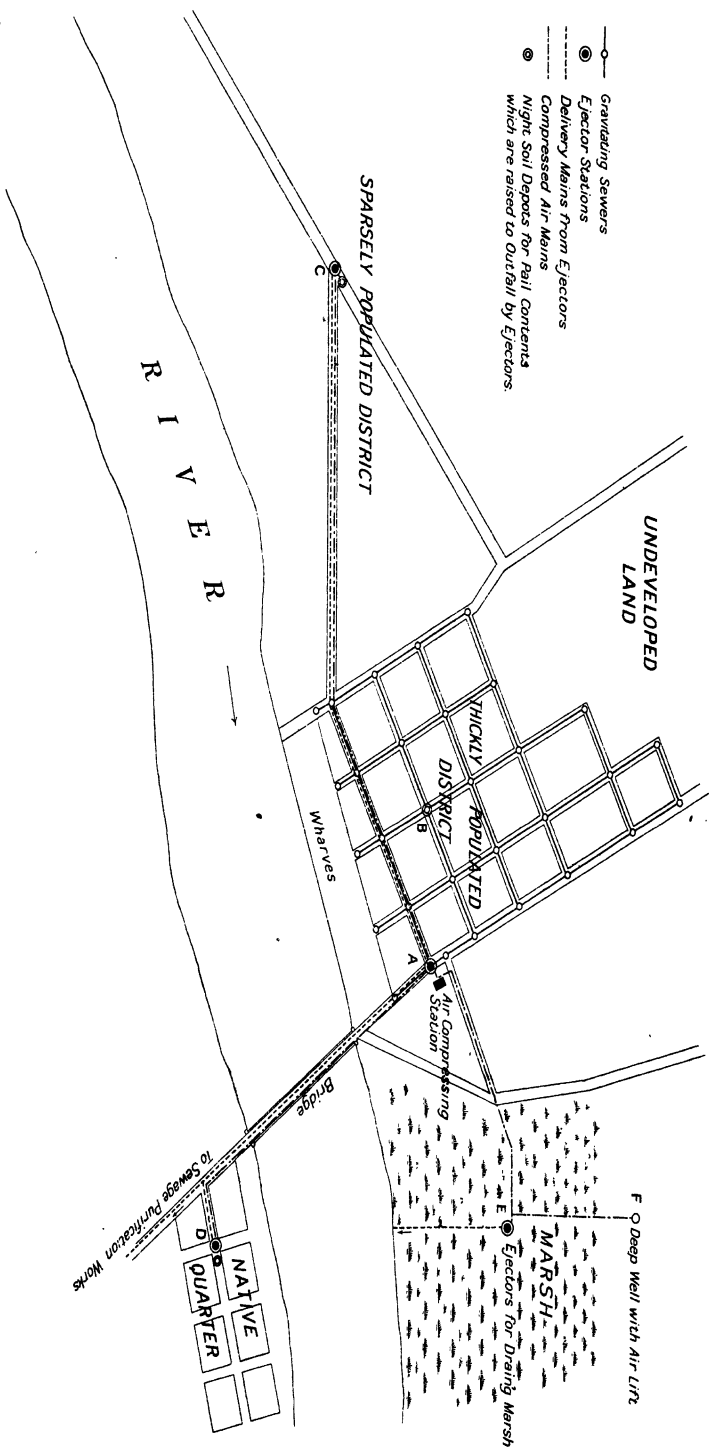




## NIGHT SOIL DEPOT AND SHONE EJECTORS.



# **A TYPICAL TOWN IN THE TROPICS.** **EVOLUTION OF NIGHT-SOIL CONSERVANCY** **AND SEWERAGE SYSTEMS.**





by an air lift pump, or using ejectors in part or whole for relief of subsoil or surface water, in parts of the town subject to malaria and difficult of drainage.

The first figure exhibits a night soil depot (as per plan kindly furnished by Messrs. HUGHES and LANCASTER, Engineers, Victoria Street, London) on the Shone system, with its ejector and method of ventilating by the use of exhaust air. There is here shown a hydrant for pail washing but, as already remarked, such washings need not be effected here as an essential part of the process, nor be used for dilution of the faecal matter.

The second figure shows the adaptation of the Shone system to a typical tropical town, in accordance with its grade of expansion on the principles above indicated. The whole area is possessed of gradients that would not favour a gravitation system of sewerage, but yet, by means of short lengths of sewers serving ejectors, there can be secured the full benefit of self-cleansing velocity, without the objection of these being laid at undesirable depths. In the thickly inhabited area, sewers have been duly laid to an ejector (A) and the richer inhabitants have not only had their houses connected so as to remove their sullage water, but have adopted the water-carriage adjuncts for excreta. Mingled with these houses, however, are a few of a poorer class, where latrines are still adhered to. The night soil from these is therefore delivered by ordinary transport at the ejector station. In a certain portion of this area, however, the people are of a poor class and still adhere solely to latrine methods—public and private. This necessitates separate removal. In this case, instead of its being necessary to transport the excreta to the distant ejector station (A), it suffices to have a site over a sewer (B) arranged for dumping pail contents. The resulting economy may mean the difference between the cost of upkeep of animals and carts and hand carts drawn by the same men who collect pails.

In the sparsely inhabited area and in the native quarters for labourers, public and private latrines only are employed, whilst no sullage water removal is yet attempted. In both cost of transport of excreta is economized by direct dumping at ejector stations (C and D).

It is of course to be understood that the position of depots and ejectors is merely diagrammatic and that in practice these are placed in secluded spots.

A small, yet as to malaria spread, dangerous swamp is in proximity to the thickly inhabited area. It is within a depression expensive to fill, and cannot be drained by gravitation to the river without a discharge main long (and also expensive) owing to small fall available. Here an extension of the air pipe to an ejector station (E) receiving subsoil drains would meet the difficulty, by direct transmission of the subsoil water to the river.

But the swamp is but an indication of subsoil water obstructed in its outflow to the river. At greater depths in this slope towards the river may be water of a purity that may warrant the sinking of a deep well (F) for the supply of a part of the population. Here then the pipe conveying compressed air may be delivered for the actuating of an air lift, by adaptation of the usual methods of regulating the pressure at this point, and thus save special pumping machinery. It might so happen that the subsoil water before reaching the marshy

area is potable at the site shown on the plan ; in which case removal of water by the air lift for public supply would also aid the drying of the swamp.

#### ECONOMY AND POLICY OF COMBINED CONSERVANCY SYSTEMS.

As regards the various combinations\* described in the preceding Notes, an objection that might be urged is that it is not proved that any material saving, when contrasted with ordinary methods of transport by animal power of faecal matter, is effected ; as under certain of them transport by hand carts drawn by men, or by bullock or pony carts is contemplated to a limited extent.† Nevertheless, if the annual expenditure saved (with its increments due to increasing population) in the differences between cost of transport of combined urine and excreta, or these separately, for short and long distances respectively, be regarded as interest and sinking fund on a loan for the carrying out of the systems indicated, it will be found that the more cleanly and expeditious methods suggested are ordinarily the cheapest.‡

Again, it may be objected that if a part of a town is so advanced as to demand sewerage, instead of temporizing by night soil dumping in ejector stations and in sewers till the poorer inhabitants avail themselves of water carriage, this could at once be enforced by legislation. In European towns, a class of house and a class of people within defined areas render such legislation feasible ; but in tropical towns (without discussing the various reasons) as a fact, it is not so. The Sanitarian has ordinarily therefore either to let matters await the millenium, or act with discretion, in the interest of the majority, by adapting his methods to the needs of mixed classes.

#### THE LIFTING OF PETTY WATER SUPPLIES.

One of the difficulties attending methods of lifting water from wells by manual labour is discussed in para. xxiv of the Annual Report of the Medical Department, Sierra Leone, for 1914. This is common to the tropics, where the desire is to secure a machine of simple mechanism, sanitarily sound as to prevention of water contamination, conjoined with the ambition that it should be practically unbreakable.

In Sierra Leone "water elevators" used are liable to breakage. Hence, before expansion of their use, the necessity for employing mechanics is discussed. The Madras Government, as stated in a previous Sanitation number of this *Bulletin*, has placed its faith in "semi-rotary pumps." These are of very simple mechanism and are reasonably durable for village use : but, in recognition of inevitable mishaps with any form of mechanism, as a part of their scheme travelling mechanics have been placed in charge.

As to water-elevators, it is worth remembering that they vary in nature of material. There are some cheap varieties, possibly of foreign make, on the market, the working parts of which are of cast-iron.

\* See also Note "The filter and night soil conservancy," this *Bulletin*, Vol. 4. p. 461.

† By using Shone ejectors, the Warrington Borough Council saves on animal transport £2,000 per annum.

‡ It is of course admitted that unusual conditions of distance and cost of labour in certain localities may prove the exception to the rule.

The shock which such material gets in the hands of a villager to secure the movement of discharging the water, soon results in fracture of some material part. The moral is that *none* should be accepted the working parts of which are not of wrought iron, or better, if funds "will run to it," of phosphor-bronze. But, as the valuable function they fulfil is really the complete covering of the well mouth, instead of the use of a winch inside the dome, it should be possible to excogitate a form in which the bulk of the motive apparatus is placed outside—but covered and easy of inspection.

In obtaining pumps for Asiatics (Indians) possessed of caste sentiments, another difficulty is that no part should be fitted with leather.

Even however with the pump and the travelling mechanic provided, it does not follow, on intimation being given that a completed well is at disposal, that certain castes of Indians will use it. In parts of India, it is considered requisite that certain ceremonies be performed before a new well can be safely employed without pollution being entailed; and the not too sanguine sanitarian should arrange that a portion of the "contingencies" of an estimate be placed at the disposal of a leading man in the village concerned to see these are correctly carried out.

#### PUMPS ACTUATED BY KEROSENE OIL ENGINES.

By the time a village of reasonable prosperity reaches the dignity of about 5,000 inhabitants a public water supply from wells, owing to present-day cheapness of plant and the use of kerosene as fuel for engine driving, should be a possibility, if the more satisfactory method of supply of water by a gravitation system be out of the question. Although most desirable this by no means need imply "in the absence of funds" complete distribution throughout a village.

A kerosene oil engine requires little skill, provided the attendant appreciates the virtue of cleanliness. An intelligent Asiatic of the labouring class is quite capable of acquiring all the knowledge requisite. The pay for both driver and fuel therefore are ordinarily not insurmountable difficulties.

For many years, manufacturers ignored requirements when small quantities of water were to be lifted, but now cheap oil engines are to be obtained. For example, an engine and pump which will deliver 1,000 gallons per hour against a total head of 80 feet and consume only  $1\frac{1}{2}$  pints of refined petroleum per hour is in the English market, at a cost of £64. Another at a cost of £68 will deliver 2,000 gallons per hour against 100 feet total head, with a consumption of 2 pints of refined petroleum. With cheap engines of this character at disposal, many difficulties as to the water supply of public institutions and villages should be solved.

By choice, a small centrifugal pump discharging into an elevated cistern with pipes and numerous taps delivering on the spot, for carriage to houses by the people concerned, meets most but not all sanitary difficulties, e.g., that of house storage. The method is however at least capable of converting a tank or well hitherto defiled by the dipping of contaminated domestic vessels, ropes, etc., into a protected source of water supply.

Kerosine oil engines are now being largely used in India for irrigation purposes, and facts useful to the sanitarian may be derived therefrom. Mr. CHATTERTON, the officer in charge of the Department of Industries, Madras, advises where kerosine oil is not obtainable, the use of suction gas producers employing charcoal or even wood. In the United Provinces, according to Dr. A. E. PARR, Deputy Director of Agriculture, when the lift is 20 feet and the discharge 8,000 to 10,000 gallons per hour, the oil engine affords cheaper power than bullocks. He states that the favourite installation with the landowners and cultivators for irrigation consists of a 7 or 4½ horse-power oil engine, and a 3 inch or 4 inch centrifugal pump.\* Mr. Chatterton† gives a useful hint when a long delivery main is requisite:—"To avoid loss of head in the delivery main, the diameter should be nearly twice that of the pump. Recently, I have installed a 5 inch main 450 feet long to a 3 inch centrifugal pump with satisfactory results."

The mere mention of using engine power to lift village water supplies is liable to cause local authorities to have visions of exhausted funds; consequently, the following data published by a landowner, Mr. S. PANDURUNGAM, of Cuddalore, Madras Presidency, although secured in using a probably older type of oil engine than those referred to above, should sufficiently prove the writer's suggestion as to cheapness of method of lifting and, especially, the small grade of skill required in the driver:—

"I am now working with a 9½ B.H.P. engine and a 4-inch pump and the cost is:—

	Rs.	As.	P.
Liquid fuel for 10 hours at 1 gal. per hour	1	14	0
Lubricating oil, waste, etc. . . . .	0	0	6
Pay of driver at Rs.15 per mensem . .	0	8	0
12½ per cent. on the outlay of Rs.2,500 . .	0	14	0
Maintenance, renewal of belting vaporiser, etc., at Rs.200 per annum . . . .	0	10	0
The total cost for 10 hours is . . . .	Rs.4	4	0

A 4-inch pump will pump out 325 gallons per minute, and will irrigate 8½ acres in 10 hours, with one inch of water. Thus the cost of irrigating 8½ acres is Rs.4.4, or 8 annas per acre. The cost of watering 1 acre by piccotah will be at least Rs.1.8. . . . . An expert is not wanted at all to manage the engine. A farm servant, if trained, will do. I have trained a pariah farm servant on Rs.3.8.0 and a Sudra boy on Rs.7. I am going to send back the driver and put the engine in charge of one or other of the said two servants."

#### OPEN SURFACE OR UNDERGROUND SEWERAGE ?

In Vol. 4 of this *Bulletin* (No. 8 (Sanitation Number), November, 1914, p. 459) the writer briefly referred to the laying down of "make-shift drains," as affording at least little excuse for leaving thickly inhabited parts of tropical towns devoid of some approach to reasonable methods of sewage disposal. As a town advances in importance the necessity for radical methods must, however, force itself upon attention, and the sanitarian dealing with the subject will find himself "up

\*Indian Engineering. 1915. March 27.

†Eastern Engineer. 1915. June, p. 223.

against" various, and very opposite, opinions. They are the product of two schools—those who believe it absolutely out of the question to use surface drains, and those who believe it is impossible to use underground drains in the tropics with, perhaps, a saving clause as to large cities. These opinions are complicated by the fact that, notwithstanding the proposal to use underground drains, it may not be intended to abandon any existing method of night soil collection and removal.

In endeavouring to weigh the pros and cons of the matter, it is well in the first place to get rid of the use of the term "sullage" as applied to drain contents of tropical towns. Disregarding the use of refuse water flow for the water carriage system (for which of course the open drain is not suited), the sullage from average houses is as dangerous bacterially as if it fulfilled the function of night soil carriage; as, irrespective of the occasional receipt of such fluid excreta as cholera affords, the washings of private latrines must be frequently present. Hence, the term sewage sufficiently covers requirements.

The "all open drain" school argue that, in the presence of primitive conditions of the people and an imperfect type of local administration, underground sewers imply continual risk of chokeage, and that even if it is unsightly to see masses of sewage (usually accompanied by vile odours) on both sides of a street, the gas escapes into the open air and the all-beneficent sun will see to it that no harmful germ shall survive etc.

But against this it may be said that, if underground sewers are laid at proper self-cleansing gradients, are correctly controlled and provided with ordinary methods of flushing and prevention of the entrance of gross matter, choking need not occur. Further, it may be contended that the daily cleansing of open drains involves the collection and transport of sewage saturated matters and silt by special staffs and plant, especially in those of poor gradients or when velocity is retarded by road debris. Indeed in such instances if an open drain is long, the sewage may arrive at the outlet without appreciable sludge so that expensive cartage and staff are required for work that would be fulfilled by underground sewerage; and with the diurnal fluctuations of daily contents, the invert of the drains exposes material conveyable by flies in spite of the sun. Intramural open drains are not, and should not be made of a size to convey all rainfall; consequently, at some points overflow occurs at certain seasons over streets walked on by persons with bare feet, and this illustrates a mode of conveyance of sewage borne organisms which may well rival the action by flies as carriers, having regard to the habits of the races ordinarily concerned. When managed by badly supervised cleansing staffs, heaps of unremoved rubbish and silt\* are found at the side of drains pending removal and, in course of time, the ground close to the drain becomes marked by accretions of dry sludge.

But the great standpoint of the all open drain party is that it is cheaper to lay such drains than underground drains. This however is far from necessarily correct. Indeed, it is rarely correct if the

\* Some advantage is gained by collecting it in on a concave surface, of iron mesh (after the style of a peaguard) placed over the drains, resting on the curbs during cleansing. Matter thus collected is well drained before putting into a cart for transport.



treatment of equal areas be compared, except in regard to charges for skilled supervision, when it is self-evident a better class of skill is requisite both in designing and in execution of an underground system. Those who contend for cheapness of open drains are apt to forget that, to adopt the system effectively, it is not wise to have in the course of a drain frequent curves checking velocity; consequently, to secure the reasonably straight lines of a street, buildings facing a roadway may have to be razed in part or whole, culverts and house approaches across drains have to be made, and, if the system is to be of the slightest use to the inhabitants, each house must have such grading of its premises as will permit of junction. Not only so but, unless the open drains are at times to be at undesirable depths below the roadway, either the gradient and size of the drains must be undesirably modified, or the expensive expedient of regrading the road must be made. As open drains must be on both sides of the road, the traffic space is proportionately diminished.

It is of course easy to impress a local authority with the cheapness of the open system by quoting average cost of drains per running foot; but if this average were to include the various items above suggested, and the recurring cost of staff for collecting silt and rubbish from open drains were weighed against the original cost of underground drains and their maintenance, the balance would often be in favour of an underground system; more especially if it be remembered that by the latter method water carriage of night soil can replace, in part or whole, the outlay upon night soil removal under the latrine system.

If however lack of suitable material overshadows other considerations, the writer believes a combination of the two systems, at times, may offer economy and an approach to efficiency. An open drain receiving proportionate increments of sewage, according to increasing length as area after area is served, must reach either an undesirable size or a gradient that may not be obtainable. On the other hand, if it so happens that the sewage must reach the outlet for treatment on filters or land at a level that will not demand the cost of pumping, exactly the same may be said of an underground sewer. Under such circumstances, it may be possible to devise a combined open and underground scheme that may have overflows for storm water in safe directions, and moreover in which the underground sewers may at points relieve open drains of surplus flow and thus prevent their approaching an undesirable size. This can be effected by arranging that sewers designed to divert sewage from open drains should take a new direction, so as to serve areas worked entirely by the underground system.\* *The method economises available gradient to the utmost.*

However, there will always be room in argument for the supporters of both the open and underground systems and, where small villages are concerned, the latter may well yield to the former. It is in such situations that the advantage of less skill being required both in design

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\*The writer has seen a system laid down by a devotee to "open drains" in which whilst on two sides of a long and important thoroughfare these were manifest to the public eye and nose, in the centre of the thoroughfare there was an expensive underground sewer. To have joined on the houses to the sewer would have been an unpardonable sin against the open drain system!

and execution may turn the balance. But even this less skill may not prove economical, unless knowledge of essential points be at disposal. Hence to get information as to the designing of open drain sullage systems in tabloid form, must prove of great advantage to sanitary officers who suggest, engineers who prepare and execute schemes, and local authorities who finance them. This object has been met in a concise and most useful manner by Mr. A. G. MONTGOMERY, Sanitary Engineer to the Government of the Punjab, in a brochure which though of official origin is doubtless obtainable by purchase from the Superintendent Government Printing, Lahore, Punjab.\*

\* "Notes and instructions for those engaged in the preparation of schemes for the surface drainage of Punjab towns," by A. G. MONTGOMERY, Sanitary Engineer to Government, Punjab. Revised Edition. Lahore: Printed by the Superintendent Government Printing, Punjab, 1914. It is fully illustrated with plans and tables for calculations.

## LANDS AND BUILDINGS.

## TOWN PLANNING.

The Government of Madras has taken up the cult of town planning *con amore*. They recently engaged Professor GEDDES to deliver lectures on the subject. Following this a scholarship has been founded, enabling the holder to study the subject in other countries. Further, a Special Town-Planning Officer has been appointed, who "will make himself familiar with schemes already proposed" but is not bound by them. He will arrange his tours in consultation with the Sanitary Commissioner whom he will meet at all, or most of the towns to be visited. He may consult the Sanitary Engineer whenever he finds this course necessary.

"The Special Officer will be requested to prepare his reports in triplicate, one copy being submitted direct to Government. The duplicate should be forwarded simultaneously to the Sanitary Commissioner who will be requested to submit to Government, within one month of the receipt of the report, any remarks which he may have to offer on the sanitary aspect of the Special Officer's scheme. The triplicate copy should be sent simultaneously to the Chairman of the Municipal Council who will please submit it within the same period to the Government, through the Collector of the district, with remarks."

The Town-planning Officer under the Madras Government will have a most interesting task before him, but will have more necessity for tact and patience than money in fulfilling his task. The average inhabitant of Southern India may not object to receive the very just and ample compensation which accompanies the cutting down or improvement of a dwelling, but to ask him to leave his old house for a new site is quite another matter—may he not leave all the luck behind? Under the influence of such sentiments (akin to allégiance to "mascots" in Europe and which education fails to remove), the man who has become rich will cling to the mean house where luck first came to him. Even if he buys new houses and new sites, and apparently has changed his residence, the old house will be still largely his home.

## TOWN PLANNING PRELIMINARIES.

A too frequently forgotten preliminary to the taking of any town improvements in the tropics has been kept well in mind by the Madras Government for many years, namely, the complete survey of towns. This is of course a long and laborious task in large towns, but in 28 municipal towns the work has been fulfilled up to date. In the absence of a complete survey, any effort towards settlement as to who are the owners of properties and what their boundaries is liable to become a task of Sisyphus, and a Town-planning Officer or his representatives would spend more time in law courts than in attending to legitimate expert work.

## PRIMITIVE TOWN PLANNING.

*Zones.* According to the Annual Report for Papua, 1913-14, a village usually contains only one house, but it measures "anything from 60 feet to 130 feet in length." These houses are built on piles

and are well constructed. "A clear space of usually 60 feet is left all round the *genema* for dancing." Outside the boundaries of the dancing ground, the gardens are made.

According to the laws of Manu, Hindus are also required to leave a zone round their villages:—"On all sides of a village a space, one hundred dhanas or three *samya* throws\* (in breadth) shall be reserved (for pasture)"—a matter of no small import as to anti-malarial measures.

*Convenience of approaches.* This is provided for by Manu thus:—"Tanks, wells, cisterns and fountains should be built where boundaries are met, as well as temples."

*Boundaries.* "And as he will see that through men's ignorance [sarcasm ?] of the boundaries trespasses constantly occur in the world, let him cause to be made *other hidden marks* for boundaries. . . . Should the neighbours give false evidence, when men dispute about a boundary mark, the King shall make each of them pay the middlemost amercement as a fine."

### WOOD PAVEMENTS.

Some years back there was a crusade against wood pavements in London. Fibre particles detached by traffic and conveying microbes of sorts were blamed for creating evil conditions of the nose and throats of passengers. In the tropics how far these possible conditions are mitigated under sun action during the dry season and free washing during "the rains," has not apparently been the subject of experiment. The matter is, however, of practical importance, as there are at times great areas of alluvial deposits innocent of stones, where the expense of importation of "road metal" is greater than would be implied by the use of wood.

The Chief Engineer, Calcutta Municipality, is frankly opposed to the use of wood pavements. In a Report on the subject, he states:—

"It is going to be a failure, possibly this and certainly next rains as the expansion joint at the sides is already used up for all practical purposes and in less than two months. The executive cannot be blamed for this, as I pointed out what would happen to wood pavement in Calcutta to the committee which sat some years ago to consider the question of the best road surface. The piece of wood pavement in Clive Ghat Street which has done so well is teak wood, which is out of the question now on account of the very high cost. Teak is an oily non-absorbent timber and this and the small area of the pavement in Clive Ghat Street is the cause of its success, apart from the very good wearing qualities of teak. I am personally convinced that wood pavement cannot be a success in any climate which has long alternating periods of very dry and very wet weather."

On the other hand, neither great heat nor preference for a soft wood ("babul" *Acacia arabica*) was found to be inimical to successful wood pavement in Kurachee, as shown by the following Report of the Municipal Engineer writing in February 1894 to the Sanitary Commissioner for Madras concerning wooden pavement laid down in 1886:—

"4. Since 1886 from 10,000 to 15,000 square feet of roadway have been paved every year, and this rate will be continued till the whole of the McLeod Road, over which the heavy traffic passes, has been paved with wood.

\*200 yards for a village and 600 yards for a town.

"The work in my opinion has been a most satisfactory investment on the part of the Municipality. Where macadam was used continual repairs had to be effected, and every two years new metal had to be laid over the whole of the road; but since the wood blocks were laid, no expense for repairs has been incurred.

"There is no appearance of organic matters having lodged in the wood during the time it has been laid down, and as far as I can see, it may be regarded as sanitarily perfect in its present position, i.e. in a wide thoroughfare. I would not recommend it for small narrow streets in an Indian town where all sorts of filth and rubbish would be cast upon it.

"The cost of the paving laid complete with concrete underneath is 12 annas per square foot."

*Indian Engineering* discussing the Calcutta experiment (Ap. 24 1915) says, "From all accounts that we have received Merchant Street in Rangoon, which is wood paved throughout its entire length, has stood the test of time well and no complaints have ever been made regarding it."

#### LAND RECLAMATION.

To drain extensive areas of land so as to render it at once fit for agriculture and no longer suitable for mosquito breeding is an ambition ordinarily checked in the bud, on the ground of lack of funds. This may be a sufficient reply; but when there is reasonable hope of simultaneously effecting economic and sanitary results, the ambition should not be abandoned without subjecting such a scheme to full estimates. The *Engineering Record* of February 6th, 1915, gives an excellent instance how, by coordination of methods in work, the problems arising from floods and the drainage of an extensive area of swampy alluvial soil, in parts heavily timbered, were solved cheaply. Notwithstanding cost of labour being greatly above that likely to be necessary in tropical countries, excavation was carried out by contract at less than six cents per yard.

The scheme required the construction of 300 miles of ditches and 35 miles of banks for the improvement of 300 square miles of country. Dredgers were employed for excavation. One of these, when in working order, is capable of excavating 120,000 cubic yards per month.

The minimum channel excavation was 14 ft. wide at the bottom with 8 ft. depth and  $\frac{1}{2}$  to 1 slopes. The maximum section is 51 ft. bottom width, and has a cross section of 800 square feet.

#### JUNGLE CLEARING.

The carrying out of the anti-malarial measures of draining and clearing jungle, and subsequently converting it into useful agricultural ground, must occasionally be on so large a scale as to result in a project either being abandoned or, if carried on, being worked at intervals as funds become available. The latter method has neither financial nor sanitary merit. Any arrangement that will secure quick and economical work is therefore worthy of consideration.

An article by Le Roy W. ALLISON in the *Engineering Record* (New York) of July 25th, 1914 describes a "plant based upon the unit principle, and known as the Black's land clearing machine. . . . It combines the different generally used systems into one plant and affords twelve particular combinations, thus meeting almost any condition of

land and expenditure . . . operated by a gasoline engine, it consists of a five-fire Pluto stump burner, or cordwood saw, a general horse stump puller and a power stump puller."

The burner of this machine can deal with stumps up to 6 feet in diameter in 2 to 4 hours. From figures supplied, the machine is economical in working.

The following is the method of clearing practised in Papua, as reported by the Government Agricultural Department\* :—

"There are on the plantation two patent stump pulling winches, which are very powerful and can be carried about very easily by two boys on account of the weight of the machine being very light. I had a severe test and there were no stumps (except large flangy ones over 8 feet in diameter) which the small machine could not operate on successfully. Now, with regard to large stumps, there is not the slightest doubt that the electric machine we have working is absolutely the best method for extracting, as every particle of the root is either blown out or the soil so loosened that there is no difficulty for the boys in picking up or digging out the small pieces left in the ground. The combination of using the stump extracting machine and blasting, if a proper method is adopted, makes a most thorough job. The following tests were made on one acre of ground which had to be perfectly cleared so that not a particle of timber would be left lying about, as it was to be used for a nursery for planting rubber seeds, and it required to be prepared in a perfect manner to prevent any fungus diseases attacking the stumps. The experiment appears to be fairly expensive, but when you consider that the ground after bush felling is not cleared in the same manner, you can calculate that the cost for blasting the stumps would be very little and nothing approaching the cost of our nursery test.

"The following was what was used and the labour employed :—

*First Test,  $\frac{1}{2}$  acre—*

Used  $9\frac{1}{2}$  lbs. gelignite—2 shillings per lb., 16 sticks to lb.

„ 59 detonators—27 shillings per 100.

„ 43 labour units.

*Second Test,  $\frac{1}{2}$  acre—*

Used 21 lbs. gelignite—2 shillings per lb., 16 sticks to lb.

„ 112 detonators—27 shillings per 100.

„ 75 labour units.

"On the first test the winch grubber was used on all stumps with the exception of the very largest, and then gelignite was used. On the second test all the roots and stumps were blasted out, and the winch grubber only used for dragging out the remains of the larger trees."

\*Papua Annual Report for 1913-14, p. 148.

## VITAL STATISTICS.

## WEST INDIES.

In 1914, the estimated population of Grenada was 71,082. The birth-rate was 39·20 and the death-rate 21·29 per mille against 19·27 in the previous year. Of the total deaths (1,514) 31·3 per cent. were due to dysentery, diarrhoea and enteritis. Dysentery (297 deaths) was said to be epidemic.

*Syphilis.* In St. Vincent Dr. HUGHES, Medical Officer, No. 2 District (population 9,516) states as to syphilis :—"This disease is quite as frequently seen as diarrhoea diseases of children and enjoys a greater mortality, 203 cases with 28 deaths; and last year there were about 1,000 cases registered in the Colony. Possibly these may convey a slight conception of its prevalence and the harm it does and will continue to do."

In No. 3 District (population 10,402), Dr. ARTHUR states that during the last half year there were 39 deaths, of which "ten were due to diarrhoea and twelve to syphilis, more than half the number accounted for by this disease only. Eight of the twelve cases of syphilis were in infants, who inherited the disease from one or both parents."

In No. 4 District (population 6,000) Dr. GEORGES states :—"The chief diseases that stand out apart from the others are syphilis and infantile diarrhoea; the former existing in both the acquired and congenital forms. . . . In contrasting the deaths out of a total of 83 syphilis claimed 19 and infantile diarrhoea 13, making a total of 32 between them or very nearly 40 per cent. Now that we have a specific for syphilis in salvarsan and its duration, there is no reason why this scourge should not be practically eliminated for the Colony. The disastrous effects of this baneful malady are too well known to require repetition."

Dr. CREMONA, No. 5 District (population 4,200), states :—"Syphilis enters largely among the cases seen throughout the year and the number of cases attended to swell considerably the monthly returns."

In Grenada and St. Vincent, the above evidence shows that in respect to diarrhoea and dysentery there exists much room for Applied Hygiene, and that in the physician armed with tact and salvarsan the sanitarian would find a useful ally.

*Cause and effect.*

Ordinarily vital statistics speak for themselves; so many deaths amongst infants from diarrhoea and so many from tuberculosis call aloud for Baby-saving or Anti-tuberculosis leagues and Municipalities and Councils. But the Cayman Islands statistics show that to be free of Public Bodies is to have a high birth-rate and a low death-rate. The area concerned is not measured in square miles but in acres—61,000; the population is 5,564, the birth-rate 36 and the death-rate 7 per mille! The people suffered neither from malaria nor blackwater nor yellow fevers. Their total sanitary expenditure was nil. There were no Government hospitals or dispensaries, no special Health Officers or other registered practitioners, no Municipalities or Town Councils. But there were four Government schools

in which 505 scholars were registered, who showed their appreciation of benefit offered by an average daily attendance of 88. Clearly, here is an exemplification of the supremacy of education over Applied Hygiene; *or*, are the Cayman Islands waiting till imported pathogenic germs show that a "nil" expenditure under sanitation is not sound economy? Possibly also registration requires an improved subordinate agency.

### *Trinidad.*

The infantile death-rate per 1,000 births, in 1913-14, amounted to 207 in Mayaro and 204 in St. Anns, but the "lowest rates are recorded in respect of Toco and Blanchisseuse, which have had reputations as malarial districts; and in which it appears that the rates of deaths of infants under one year of age to 1,000 births are comparatively very low, being 117 and 50 per 1,000 births respectively." This statement is interesting but unfortunately lacks statistical proof, in so far as the respective populations dealt with are not available in the Report. But so far as gross figures are concerned, Blanchisseuse shows the smallest number of deaths from malaria in the towns and wards of the Colony.

Of every 1,000 deaths, 160 were classed under diseases of the digestive system and of these 80 per cent. were due to diarrhoea, enteritis and ankylostomiasis.

### PANAMA CANAL.

On the Panama Canal, during 1914, the death-rate per mille for the white race was 6.6 and for the coloured 7.10. The constantly sick rate per mille was for the white race 23.20 and for the coloured 10.16.

Panama City\* has a population of 53,948. The death-rate during 1914 was 32.85 per 1,000; the birth rate 54.52. The infant mortality for the same period was 272. Much overcrowding exists. Tuberculosis gives a death-rate of 4.26 and 12 per cent. of total deaths.

### ZANZIBAR.

The following are the diseases which, according to the Annual Report of the Medical Department, Zanzibar, for 1912, by the Principal Medical Officer, Dr. G. A. McDONALD, are those which "claim the greatest number of victims":—

1. Tuberculosis	..	..	15.9	per cent. of the total deaths.
2. Debility	..	..	14.0	" " " " "
3. Malaria	..	..	13.3	" " " " "
4. Diarrhoea and Dysentery	..	..	10.2	" " " " "
5. Bronchitis	..	..	7.0	" " " " "
6. Dementia	..	..	5.4	" " " " "
7. Anaemia	..	..	5.2	" " " " "

Elephantiasis is reported to be "lamentably common." In reference to anaemia ankylostomiasis is frequent.

The crude death-rate for the whole island is 26.7 and the birth-rate is 13.7.

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\* Report of the Department of Health of the Panama Canal Zone. 1914. p. 8.



Captain SKELTON, R.A.M.C., writes a paper in this Report discussing the causes of the small birth-rate amongst the Swahilis. In this several possible causes are passed in review, but he does not profess to have solved the problem. He points to the first essential of means being taken to secure, either by rewards or legislation, more complete registration statistics. As the question of continuance of this race is of economic interest in Zanzibar, this step would seem to be of urgent importance.

Dr. MacDONALD concludes his remarks on vital statistics of Zanzibar with the following statement :—

“Taken as a whole Zanzibar can no longer be regarded as Burton looked upon it, that is to say, as almost a death trap for Europeans. Malaria, dysentery, debility and anaemia are all preventable and can be diminished still further.”

#### THE CONDITIONS FAVOURING THE BIRTH RATE.

Dr. R. L. BELLAMY in the Annual Report for Papua (1913–14) makes the following remarks :—

“Conclusions drawn from only fifteen months statistics are liable to much error, but it is interesting to note that, so far as these figures go, the month of May in both 1913 and 1914 gives, in each case, the greatest number of births, viz., 33 and 42 respectively. Dating back nine months, we get September, which is the middle or height of the Trobriand village dancing. The native food crops have then been safely garnered, there is abundance of food of all kinds, there is a slaughtering of pigs, and a time of general rejoicing. Is September or its neighbourhood the breeding season for the Trobriand Islander ? ”

## TROPICAL DISEASES BUREAU.

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## HELMINTHIASIS.

LEIPER (Robert Thomson). [Report on an Expedition to China to Study the Trematode Infection of Man.] Unpublished Report to Colonial Office. 1915. Jan. 15. 4 pp. f'cap.

Under date 1st January 1915 Dr. R. T. Leiper reports to the Colonial Office on the expedition undertaken by himself and Surgeon E. L. ATKINSON, R.N., to the Far East to investigate the trematode infections of man. The expedition was cut short by the outbreak of the war, but its main objects had been already attained. It is noted that the occurrence of the various infections of man in domesticated animals, especially dogs, rendered the work independent of hospitals and native patients. Shanghai was fixed upon as the centre, being within easy reach by rail and river boats of the endemic areas of schistosomiasis. *Clonorchis* and *Yokogawa* proved to be endemic in and around Shanghai itself and *Fasciolopsis* was found within two hours. Various molluscs and other possible intermediaries were obtained within a hundred miles of Shanghai by working from a house-boat upon the canals which intersect this region. The summary of results as regards infections other than *Schistosoma japonicum* is as follows :—

“(a) The following helminths, which occur as parasites of man, were found in dogs collected by the police from the Shanghai municipal area :—*Clonorchis sinensis*, *Yokogawa yokogawai*, and *Dibothriocephalus latus*. A species of Echinostome, a new *Metorchis*, *Dirofilaria immitis*, and the common *Ankylostoma caninum* were collected also.

“(b) We were unable to establish the complete life history of *Clonorchis*, but it is noteworthy that no species of trout (which has been shown to be the carrier in Japan) occurs round Shanghai. Houghton has claimed to have found a free-moving cercaria on the mucous membrane of the gut of certain fish from the River Yangtse. We have found a similar body to this, but are convinced that it has nothing to do with the life cycle of *Clonorchis*. A study of the morphology of these canine *Clonorchis* throws some light upon the question of duality of species.

“(c) *Yokogawa yokogawai* occurred in a large number of the dogs in Shanghai. This parasite has not heretofore been noted as occurring in China. We found in a kind of perch not yet named encysted cercariae, which further work will probably prove to be the larval form of this parasite. The eggs resemble closely those of *Clonorchis*, and it may be that records of the discovery of *Clonorchis* eggs in faeces in human cases in Shanghai may be to some degree inaccurate.

“(d) *Dibothriocephalus latus* was found in one dog, and the eggs were isolated and set aside to hatch for experimental work. The text-books

state that even in warm weather a month is required for the proper formation of the embryo. These eggs hatched quite unexpectedly within a fortnight, when we were not thus early prepared to follow their further course. It is a remarkable thing that, although the infection of man and dogs with this form has been repeatedly carried out in feeding experiments with infected fish, no one has yet succeeded in ascertaining whether the fish are directly infected or secondarily through another intermediate host.

"(e) The Shanghai dogs were also heavily infected with a species of Echinostome belonging to the genus *Echinochasma*. We succeeded in recognising the larvae of this form in a fresh-water fish, not yet named, common in the markets of Shanghai, and in experimentally infecting a dog by feeding. This form may prove of further interest, for the egg resembles very closely that of *Fasciolopsis buski*, and it would be not at all surprising to find it as a human parasite of man in China.

"(f) A new *Metorchis*, obtained from the bile ducts of a dog, is of interest as possibly throwing light upon the reputed *Metorchis truncatus* reported from man in Siberia. This form resembles, when stained, *Opisthorchis sibericum* much more closely than does *Metorchis truncatus*. It is small, the skin is covered with spines, the testes are tandem and deeply lobed.

"(g) *Diriofilaria immitis* in Shanghai, as in other parts of China, is very common in dogs, but, as its life history has already been traced, it did not seem advisable to devote time to this form.

"(h) *Ankylostoma caninum*, the common hook-worm of the dog, occurs in practically every dog examined. We found no other species. This is of interest, in view of the statement in Jeffreys' and Maxwell's "Diseases of China," that *Ankylostoma duodenale* of man occurs also in dogs in Shanghai.

"(i) In the public abattoirs we devoted some attention to the parasites of pigs. *Trichinella spiralis* would appear to be very rare, if it occurs. We did not come across or learn of a single case. The pigs were remarkably free from parasites. The pigs in the south of China are often infested with a species of *Fasciolopsis*. We received specimens in cold storage from Hong Kong and were able to compare the anatomy with that of typical *Fasciolopsis* from Shaohsing. All specimens show the same morphology. Differences which have given rise to various specific designations are easily produced by various manipulations. It is especially notable that all specimens, both from pig and man, have spines on the skin in the living state.

"The larval stage of *Fasciolopsis* is said to encyst in freshwater shrimps. We found these cysts and attempted to infect pigs, but were unsuccessful.

"(j) The occurrence of a very good case of ankylostomiasis at Hangchow enabled us to test the practicability of employing chemical manures to destroy ankylostomes in faeces without impairing the organic manurial value. All the commonly used chemical manures were tried, and with one we obtained highly suggestive results. The method must be repeated in a larger series of laboratory experiments, but if these prove equally effective our work may point to a simplification of the nightsoil problem in tropical communities."

An account of the investigation regarding *Schistosoma japonicum* has been published in the *Brit. Med. Jl.* [see below].

A. G. B.

LEIPER (R. T.) & ATKINSON (E. L.). Observations on the Spread of Asiatic Schistosomiasis. With a Note on "*Katayama nosophora*" by G. C. ROBSON.—*Brit. Med. Jl.* 1915. Jan. 30. pp. 201-203. With 1 plate and 1 fig.

The authors note that from 1852 when BILHARZ announced the discovery of *Distomum haematobium* down to 1904 no progress was made in the elucidation of the etiology of schistosomiasis. At the

end of 1913 it was reported that MIYAIRI of Kiushu had found a reproductive stage of *Schistosoma* in a *Lymnaeus* species. The Commission formed by the two authors left England in February 1914 and was engaged in the work until the outbreak of war in August. The headquarters were at Shanghai. "The Looss hypothesis of direct infection was set aside in favour of one to the effect that the schistosome conformed in essentials to the life cycle of other digenetic trematodes." The method employed was "to submit all likely hosts to an overwhelming infection; the proper host will show a marked, even a fatal susceptibility, while other even closely allied hosts will remain uninfected." It was necessary first to obtain an animal with such a heavy infection that the eggs could be separated from the faeces with little contamination. After a search of three months a suitable dog was found, the motions consisting almost entirely of mucus and blood crowded with eggs.

"Our second necessity was to localise a small village with a fairly high percentage of infection amongst the inhabitants, and then study the local molluscan fauna and submit the various species to the 'blunderbuss' test. Further, by dissection of the various molluscs from such a defined area, naturally infected specimens might be found, and the nature of the infection diagnosed:

"(a) By certain peculiarities that the cercaria of the schistosome should reveal; and

"(b) By a second 'blunderbuss' test to infect a susceptible mammalian host with material from the suspected intermediary host."

They failed to find such a village in the Lower Yangtse Valley. Molluscs were collected and dissected throughout the whole region and cercariae were found but none "presented the one morphological character—absence of pharynx—which would have established a strong presumption in favour of a hypothetical schistosome larva." They then decided to examine Katayama in Japan, where FUJINAMI's early experimental infections of animals by immersion in paddy field water had been carried out. Large numbers of various species of molluscs were brought to Shanghai, including the form described as *Katayama nosophora*.

"The molluscs from Katayama were submitted to the biological test in Shanghai, and a small brown form with eight spirals and an operculum, named *K. nosophora*, showed an extraordinarily marked attraction for the miracidia, as contrasted with the other species. The small dark head and foot speedily became festooned with little white specks, and it was obvious from the agitated manner in which the snail repeatedly attempted to brush them off that their presence was a cause of considerable irritation. . . . In many specimens the liver was found ramified with long intertwining delicate tubes bluntly rounded at the extremities and containing cercariae with bifid tails. . . . There was complete absence of pharynx."

A second visit was then paid to Katayama and a large supply of these molluscs was collected. At Shanghai their livers were teased in fresh water and the cercariae allowed to become free and swim about. Laboratory bred mice were then immersed, none of the fluid being allowed near the mouth. A start was then made for home. Three of four mice died within the first few days. At Aden the few molluscs still alive were sacrificed and the last remaining mouse was submitted to infection. This animal was killed a month later in the laboratory of the London School of Tropical Medicine and many male and female schistosomes *in copula* were found in the portal vessels.

A permanent preparation was made of the gut with the mesentery undamaged, showing the paired worms *in situ* in the veins. This is reproduced.

The marked attraction of the mollusc for the miracidium, the peculiar morphological characters of the cercaria and the successful infection of a laboratory-bred mouse from cercaria obtained from Katayama molluscs after several weeks' captivity at sea leave no room for doubt that the schistosoma has a life-cycle similar to that of other digenetic trematodes."

An account is given, with figures, of the developmental stages in the mollusc. The authors conclude that the above results confirm MIYAIRI'S main conclusion as to the transmission of *Schistosomum japonicum*. His paper is inaccessible. The only information available is an annotation by KUMAGAWA in the *Tropical Diseases Bulletin* for March 30, 1914 (Vol. 3, pp. 289-90). Mr. ROBSON'S note describes the new genus and species of mollusc. The points in the paper are clearly illustrated in the plate.

A. G. B.

CAWSTON (F. G.). *Bilharziosis in Natal*.—*S. African Med. Rec.* 1915. June 12. Vol. 13. No. 11. pp. 160-161.

The author's observations in Maritzburg lead him to conclude:—

"(a) That the numerous eggs contained in the bladder of Bilharzia patients do not hatch until they reach fresh water.

"(b) That freshwater rivers and pools are quickly infected by Bilharzia patients who pass their urine into them.

"(c) That, as the larvae soon die, even in diluted urine, they cannot infect an individual by passing along the urethra, unless they alter their characters considerably before they do so, possibly by route of an intermediate host.

"(d) That infected individuals should be warned of the danger to the community of passing their urine into fresh water and warned against entering infected streams.

"(e) That uninfected persons who are free from sores or cuts on the skin, and who have been circumcised, are less liable to infection than swimmers who have abrasions of the skin or a long p.euce, which might retain larvae in very diluted urine. And that these persons are less liable to infection if they are careful to wear costumes during bathing and to dry themselves thoroughly on leaving the water.

"(f) That treatment should aim at the eradication of the worms from the bloodstream.

"(g) That, as the eggs die rapidly in undiluted urine, their presence in the bladder is a matter of secondary importance.

"(h) That surgical treatment of the bladder in the acute stage can only aggravate the affection and, where possible, is better avoided in the chronic stage.

"(i) That attention should be paid to the bacterial condition of the bladder, the general health and associated anaemia."

R. T. Leiper.

WATKINS-PITCHFORD (W.). *Note on Schistosomiasis*.—*Med. Jl. S. Africa.* 1915. July. Vol. 10. No. 12. p. 226.

As Director of the South African Institute of Medical Research Dr. Watkins-Pitchford communicates the results of some experiments made by Dr. F. G. CAWSTON on the transmission of the *Schistosoma haematobium*. From a swimming pool at Pietermaritzburg which was generally believed to be a source of bilharzial infection a number of

small snails of the family Limnaeidae—identified by Dr. E. WARREN as *Physopsis africana*—were transferred to a dish containing fresh water and to this a small quantity of urine containing Bilharzia eggs was added. The livers of these snails at first showed no microscopical abnormality. After three weeks however cercariae were found encysted in the liver of one of the snails. Dr. WARREN is stated to have looked upon the observation as merely tentative and deprecates the drawing of definite conclusions. [In a lecture to the Royal Society of Medicine, in July, the annotator described the life cycle of Bilharzia, and the successful experimental infection of monkeys in Egypt.]

R. T. L.

**DARLING (S. T.). The Pathological Features of a Case of Bilharziasis of the Large Bowel in a Martiniquan.**—*Proc. Med. Assoc. Isthmian Canal Zone.* Oct. 1912 to Mar. 1913. Vol. 5. Pt. 2. pp. 52-55.

The body was much emaciated. Yellow fluid pus in large quantity was found in the pelvis. The small intestines were matted together by recent adhesions. The descending colon was perforated and its wall, like that of the sigmoid and rectum, was very hard and firmly adherent to adjoining structures. The mucous surface of the rectum was extensively denuded and diffusely bloodstained. The lumens of the sigmoid and descending colon were greatly contracted. The wall of the bowel was greatly thickened by chronic proliferative oedema and abscesses filled with greenish yellow pus. The area involved was that supplied by the inferior mesenteric vein. The liver was atrophied but showed no evidence of infarctions or necrosis.

In sections of the gut the submucosa is greatly increased by round cell infiltration and abscesses. The perivascular channels in the muscular layer and the peritoneum and mesentery are greatly infiltrated; the chronic inflammatory process being due directly to the presence of the ova, at any rate in some places.

In the discussion on the paper Dr. DEEKS and Dr. BAETZ state that most of the recent cases came from Naos Island and occurred in negroes from Martinique and Antigua. In all the cases the ova were lateral spined and special search for terminal spined eggs in the urine was invariably fruitless. The local haematuria is most frequently due to acute posterior gonorrhoea.

R. T. L.

**MINERBI (Giacomo). La centrifugazione frazionata dell' urina per dimostrare l'esistenza di cilindruria in cistitici e particolarmente in bilharziosi.** [The Fractional Centrifugalization of Urine for the Purpose of demonstrating the Presence of Casts in Cystitis, and More Especially in Bilharziasis.]—*Riv. Crit. Clin. Med.* 1915. May 29. Vol. 16. No. 22. pp. 337-343.

The author finds that by centrifugalizing urine in successive stages it is possible to separate the different constituents of the sediment with a great deal of accuracy, owing to their differences in specific gravity. A hand centrifuge must be used. From 15 to 20 turns of the handle will throw down all crystals and amorphous urates along with the ova of Schistosomes. The urine, after being pipetted off from this

sediment, will throw down with a little more centrifuging epithelium cells, blood cells, and masses of blood pigment, if present, while last of all with 100 to 300 turns of the handle casts will come down in a state of almost pure isolation.

J. B. Nias.

EKINS (C. M.). **Four Cases of Bilharziasis under Thymo-Benzol Treatment.**—*Trans. Soc. Trop. Med. & Hyg.* 1915. June. Vol. 8. No. 7. pp 212-213.

ROBERTSON's treatment of bilharziasis with thymol dissolved in benzol was tried on four cases at Alexandria. No benefit resulted and the intoxicating effect was a great nuisance. The patients had to be kept forcibly in bed. Living bilharzia miracidia were obtained at the conclusion of the course of treatment in all four cases.

R. T. L.

LANE (Clayton). **Artyfechinostomum Sufrartyfex. A New Parasitic Echinostome of Man.**—*Indian Jl. Med. Res.* 1915. Apr. Vol. 2. No. 4. pp. 977-983. With 1 plate.

Under this distinctive name an echinostome fluke is described as new in man. The material, consisting of sixty-three flukes, was passed by a girl of about eight years of age who had lived all her life on the Ragnik Tea Estate in Assam. The specimens were considerably macerated. They measured about 9 mm. in length with a maximum breadth of 2.5 mm. and a depth of about 0.8 mm. The most prominent naked eye feature is the large central sucker which led the collector to take them for *Fasciolopsis buski*. The ventral and part of the dorsal surface is covered with spines. The collar of spines characteristic of the echinostomes was fairly complete only in one out of forty-one specimens received by Lane for description. Assuming two "collar" spines to be missing the number is 39. Two corner spines are strikingly large. The oral sucker measures 0.2 to 0.3 mm. in diameter and the pharynx is about the same size. The cirrus sac is 2 mm. long. The testes are deeply indented. In two specimens one of the testes was rudimentary. The yolk glands occupy the whole of the lateral parts of the worm from the level of the caudal half of the cirrus sac to the end of the worm. The ova measure 0.09 mm. by 0.075 mm. and have no filament. The parasite is made type of a new genus with the collar spines as a diagnostic feature and placed in the sub-family *Himasthlinae*.

R. T. L.

HALL (Maurice C.) **Taenia saginata. A Case presenting Structural Abnormalities and associated with Spurious Parasitism in an Infant.**—*Jl. Amer. Med. Assoc.* 1915. June 12. Vol. 64. No. 24. pp. 1972-1973. With 1 text-fig.

The abnormality recorded in *Taenia saginata* is a meristic variation consisting of the unilateral duplication in one segment of the genital pore, vagina and vas deferens, together with the formation on the opposite side of the segment of a simple rudimentary genital pore.

Whereas the normal adjoining segments measures 15 mm. long and 7 mm. wide this segment was 20 mm. long by 9·5 mm. wide. The uterine branching was somewhat diffuse and irregular and the eggs presented abnormal appearances in shape and did not contain any hexacanth embryos. Accompanying the tapeworm was a beetle larva, *Tenebroides mauritanicus*.

R. T. L.

MOORE (John T.). *Sparganum mansonii*. First Reported American Case. Found in a Breast Tumour at Operation.—*Amer. Jl. Trop. Dis. & Prevent. Med.* 1915. Feb. Vol. 2. No. 8. pp. 518-529. With 1 plate; and *Trans. Amer. Soc. Trop. Med.* 1914. Vol. 9. pp. 236-247. With 1 plate.

This occurrence of *Sparganum mansonii* in a native of Texas was accidentally observed as a result of an operation for the removal of "cancerous masses" in the breast. The pectoralis major muscle contained a mass of 2-4 cm. in diameter which when sectioned revealed a white tapelike parasite with active movements coiled in and between the muscle fibres. There was no definite cyst wall. The irregular crevices in the muscle contained eosinophiles and endothelial leucocytes. The worm measured 21·5 cm. in length and was unsegmented. [No anatomical details are given.] The paper concludes with a useful list of the cases of *Sparganum* hitherto recorded. Including the present there are in all twenty-five records. Of these no less than twenty have been reported from Japan.

R. T. L.

HIGHET (H. Campbell). *Ankylostomiasis in Siam*. [Correspondence.] —*Lancet*. 1915. July 24. p. 202.

*Ankylostomiasis* in Siam is due to both *Necator americanus* and *Ankylostoma duodenale*, but the prevalence of each varies in different districts. At Chiangmai Dr. KERR found *N. americanus* to be the common form, while specimens from Nan were with one exception *A. duodenale*. In Bangkok this latter was the only species found. The disease was especially rife among the Laos and Kamoos of Northern Siam. Dr. KERR states that in Chiangmai symptoms are uncommon. About fifty worms are usually found in each case. When the total approaches one hundred dyspeptic symptoms are noticeable. In 216 autopsies in Bangkok only ten were found infected although a very careful search was made.

R. T. L.

HARPER (P.). *Ankylostomiasis in Fiji*.—*Lancet*. 1914. Sept. 19. pp. 740-741.

In the Navua District of Fiji there are over 2,000 indentured Indian immigrants. The death-rate per 1,000 (excluding the deaths due to accident and violence) amounted to 96·6 in 1910, 48·1 in 1911 and 50·3 in 1912. This appeared almost entirely due to intense *ankylostomiasis*. An *ankylostomiasis* campaign was instituted which resulted in the lowering of the death-rate the following year to 26·29.



It is noted that among the measures used the provision of boots was found to be a failure as the coolies did not wear them unless under supervision.

R. T. L.

LEVY (Robert L.). *Oil of Chenopodium in the Treatment of Hookworm Infections.*—*Jl. Amer. Med. Assoc.* 1914. Nov. 28. Vol. 63. No. 22. pp. 1946-1949.

American wormseed oil is a volatile oil distilled from the fruit of a common roadside weed (*Chenopodium anthelminticum*) abundant in the eastern parts of the United States. It is, in the author's experience with two cases reported, an effective vermifuge in the treatment of hookworm and is more efficient than thymol; moreover it is not unpleasant to take, is cheap and non-toxic in therapeutic doses, and its ingestion is not followed by disagreeable symptoms. Although it has always been official in the United States Pharmacopoeia only twelve cases of chenopodium treatment appear to have been reported to date and these are conveniently summarised in tabular form in this paper. The following method of administration is recommended:—

"First Day: Liquid diet; 8 p.m., 1 ounce of Epsom salt.

"Second Day: Omit breakfast and luncheon; 5 a.m., 1 ounce of Epsom salt; 7 a.m., 9 a.m., and 11 a.m., 16 drops of the oil of chenopodium on a teaspoonful of granulated sugar; 1 p.m., 1 ounce of castor oil containing 50 minims of chloroform. Soft supper.

"Third Day: Resume full diet."

The treatment may be repeated at weekly intervals.

R. T. L.

MOUAT-BIGGS (C. E. F.). *The Treatment of Ankylostomiasis in Venezuela.*—*Trans. Soc. Trop. Med. & Hyg.* 1915. June. Vol. 8. No. 7. p. 216.

In many countries of Tropical America successful and very harmless treatment for trichocephaliasis and ankylostomiasis consists of a spoonful of milk of the higueron (*Ficus laurifolia*) for three days, taken at midday, at night and in the morning with plain or sugared water or in cow's milk. On the fourth morning the patient takes an ounce of Glauber or Epsom salts. The dose is halved for children. It is stated that this treatment is now adopted entirely by the National Board of Health for the entire suppression of ankylostomiasis in Venezuela. In the discussion Dr. Felix PAEZ adds that the latex is even more powerful in its action in infections with *Trichocephalus*. No unpleasant symptoms are caused and the dose ranges from ten to forty grammes.

R. T. L.

LANE (Clayton). *The Treatment of Ankylostomiasis, or Hookworm Disease.*—*Indian Med. Gaz.* 1915. Vol. 50. No. 7. pp. 241-245.

This article has been written at the request of the Committee of the Darjeeling Planters' Association and should be of use to medical men taking up the systematic treatment of ankylostomiasis on a large scale. The various known methods of treatment are summarised and their

merits discussed from the points of view of cost and efficiency; the information being based apparently on the published experiences of the various ankylostomiasis campaigns. A standard of comparison of the relative cost of treatment by the various drugs is arrived at by multiplying together the unit of dose, the unit of cost and the unit of inverse efficiency. The units of inverse efficiency are the number of separate treatments required to expel the worms and to effect a practical cure. These are stated to be "Eucalyptol" 5, Beta-Naphthol 3, Thymol 2, Chenopodium 2. The unit of dose is the weight of the dose of Beta-naphthol (i.e. 30 grs.) required for a full treatment. On this basis the unit treatment for "Eucalyptol" is equal to 2.6 units, for Thymol 2 units and chenopodium 1.5 units of Beta-naphthol. The unit of cost is the cost per pound in Rupees expressed in decimals.

The formula as applied to pre-war conditions in India is given in the following table:—

Treatment.	Unit of dose.		Unit of cost.		Unit of inverse efficiency.			Relative Cost of Treatment.
Eucalyptol— { Oil of Eucalyptus Chloroform	1	×	2	= 2	6.4	×	5	= 32
	1.6	×	2.75	= 4.4				
Betanaphthol ..	1	×	3.5			×	3	= 10.5
Thymol ..	2	×	16			×	2	= 64
Chenopodioid ..	1.5	×	24			×	2	= 72

[The term "Eucalyptol" is apparently used by Lane as a convenient term for the Eucalyptus-Chloroform mixture.]

R. T. L.

**BARLOW (N.). Treatment of Ground-Itch.—*Amer. Jl. Trop. Dis. & Prevent. Med.* 1915. Feb. Vol. 2. No. 8. p. 530.**

Cases of uncomplicated uncinarial dermatitis are relieved immediately and a complete cure is effected in from two to four days by an application twice daily for five minutes of a three per cent. solution of salicylic acid in ethyl alcohol.

R. T. L.

**ISMAIL (Abd el Aziz). Some Points in the Circulatory System in Ankylostomiasis: A New Explanation for the Murmurs.—*Lancet.* 1915. June 5. pp. 1175-1177.**

The following new explanation of the origin of the mitral murmurs in ankylostomiasis is offered. The contraction of the papillary muscles is to prevent the retroversion of the valve flap into the auricle; if this contraction is continued further, it will increase the convexity of the auricular surface of the flaps and would eventually pull the edges of the valves into the ventricle causing them at the same time to separate. A chink would be created, some blood would regurgitate and a murmur systolic in time result. Some facts favouring this safety valve hypothesis are, (1) The murmur is best or only heard in the recumbent

position ; (2) The murmur resembles that of mitral stenosis in being localised to the apex or internal to it ; (3) The presence of doubled first sound at the mitral is in a quarter of the cases apparently due to the vibration of the mitral cusps consequent on overaction of the papillary muscle ; (4) In the last stages the papillary muscles are found to be very fatty and to have increased in bulk as a result of previous hypertrophy and over action ; (5) A similar murmur occurs early in Graves' disease and in overstress from exercise.

R. T. L.

**YOKOKAWA (S.). On the Pathogenesis of *Strongyloides stercoralis*.—*Far East. Assoc. Trop. Med. C. R. Trois. Congrès Biennal, Saigon (1913)*. 1914. pp. 329.**

The larvae of *Strongyloides stercoralis* are not harmless as has been generally supposed. They have a strong invasive force and have been found post mortem in the muscles, submucosa and subserosa of the wall of the great intestine where there was a dysenteric ulcer. This migration had taken place before death because the larvae were surrounded by inflammatory infiltration. A certain number of larvae were also found in the wall of the ileum and as emboli in the liver. They were detected also in the lymphatic and blood streams.

R. T. L.

**WHARTON (Lawrence D.). The Development of the Eggs of *Ascaris lumbricoides*.—*Philippine Jl. Sci. Sect. B. Trop. Med.* 1915. Jan. Vol. 10. No. 1. pp. 19-23.**

*Ascaris lumbricoides* remain alive and active in KRONECKER'S salt solution (0.06 gram NaOH in a litre of normal saline) for twelve days. The females discharge their ova in large numbers, usually at night. From March to May the eggs developed in from ten to fourteen days at ordinary laboratory temperature. The most favourable temperature was found to be 30° C. Although drying does not kill the eggs a small amount of moisture is a necessary requirement for development. Development is temporarily suspended in the entire absence of oxygen although a very small amount only is required. Death rapidly ensues at a temperature over 37° C. Eggs containing well-developed embryos were all killed when placed in tap water at 70° C. and allowed to cool. This point is undoubtedly of considerable practical importance "as many fruits and vegetables which are commonly eaten raw can be dipped into water at this temperature without being injured." The embryos will not survive unless they are completely developed before being introduced into the alimentary canal.

R. T. L.

**TAKAKI (Y.). Intestinal Obstruction caused by *Ascaris lumbricoides*.—*Sei-i-Kwai Med. Jl.* 1915. May 10. Vol. 34. No. 5. Whole No. 399. pp. 28-29.**

Ascarides were found to be the cause of symptoms, in a child of three years of age, which resembled those in intussusception. A long tumour ran across the abdomen from above the umbilicus to the right

side and a small mass was felt in the right iliac fossa. There was acute abdominal pain, anorexia and vomiting. On the day after admission two round-worms were vomited. Santonin was then administered. Altogether 117 ascarids were evacuated and the symptoms thereon completely disappeared.

R. T. L.

**NAGAHAMA (M.). A Case of Severe Abdominal Pain cured by vomiting of One *Ascaris lumbricoides*.—*Sei-I-Kwai Med. Jl.* 1915. May 10. Vol. 34. No. 5. Whole No. 399. pp. 27-28.**

A healthy person 22 years of age had half an hour before breakfast a sudden attack of abdominal pain which was so excruciating as to cause him to double up his legs and press upon the abdomen with the hands. The general symptoms simulated cardiac spasm but could not be relieved by internal administrations or injections. There was nausea and a slight amount of mucus was vomited on several occasions. Next day an ascaris was vomited, whereon all the symptoms vanished.

R. T. L.

**CRUICKSHANK (J. A.) & WRIGHT (R. E.). Filariasis in Cochin.—*Indian Jl. Med. Research.* 1914. Apr. Vol. 1. No. 4. pp. 741-785. With 1 map and 7 plates.**

From a clinical examination of one thousand cases in Cochin it was found that 20·9 per cent. had filaria embryos in the blood and 12·9 per cent. showed signs of elephantiasis; 32·9 per cent. of the general population showed definite signs of filariasis and, if one includes cases showing features usually though not necessarily associated with filariasis, the percentage rises to 72·3 per cent. Fever is very common especially in the early stages of the disease. The fever is well recognised by the inhabitants, who differentiate three varieties: fever associated (a) with pain in the groins, (b) with pain in the arms, (c) with shivering only. Malaria is not indigenous in Cochin. The fever is always associated with inflammation of some part of the lymphatic system, the first two types with superficial lymphangitis and lymphadenitis, the third type with inflammation of the internal lymphatics and glands. The chief pathological feature is stated to be a progressive fibrosis subsequent to inflammatory changes due to the presence of the adult worms and not necessarily associated with a bacterial invasion.

The filaria is almost certainly *Filaria bancrofti*. A careful description is given. The genital papillae in the male varied. There were eleven pairs (six preanals and five postanals) in one specimen and nine pairs (four preanals and five postanals) in another, the interval between the last two pairs being greater than that between any of the others. Out of 120 cases periodicity was observed in thirty-one to be exclusively nocturnal while eighty showed no embryos either by day or night. In nine cases the embryos appeared by day.

From experimental work the authors conclude that *Culex fatigans* is the chief mosquito intermediary in Cochin, that *Nyssomyzomyia rossii* is almost certainly efficient and that *Culex microannulatus* and *Stegomyia scutellaris* may also act as carriers. The filarial metamorphosis in the mosquito is carefully described and illustrated.

Antifilarial measures in Cochin would be difficult owing to climatic and industrial conditions. An artesian water supply would allow most of the mosquito haunts to be abolished. Thymol, potassium iodide and injections of emetine were found to have no good effect.

R. T. L.

**WALKER (Ernest Linwood). The Morphology of the Adults of the Filaria found in the Philippine Islands.**—*Philippine Jl. Sci. Sect. B. Trop. Med.* 1914. Nov. Vol. 9. No. 6. pp. 483–491. With 1 plate.

The larval filaria described by ASHBURN and CRAIG as a new species, *Filaria philippinensis*, was based upon material from a single case. Later four other cases with the same characteristics were met with and it was concluded that this form, which exhibited no periodicity, was the only indigenous species. More recently other observers have definitely established the frequent occurrence of a filaria larva with definite nocturnal periodicity. The author examined four adult filariae from a Filipino and gives a detailed description of their morphology. In the male there are three pairs of postanal papillae and at least thirty-two pairs of preanals. These are very small and difficult to see. It is believed that the Philippine filaria is identical with *Filaria bancrofti* as there are no characters that preclude this conclusion. This does not preclude the possibility of another species existing in the Philippines, but in conjunction with the evidence of more recent studies of the larval forms it renders this extremely improbable.

R. T. L.

**MATHIS (L.). Quelques Cas de Filariose concernant des Annamites originaires du Delta Tonkinois.**—*Far East Assoc. Trop. Med. C. R. Trois. Congrès Biennal, Saigon* (1913), 1914. pp. 290–293.

Filariasis in Indochina is usually quite compatible with good health, but it occasionally manifests itself in the form of hydrocele, orchiepidydimitis, adenolymphocele especially crural, and elephantiasis. Fever is also attributable to this cause. Clinical notes of five selected cases are given. One with generalised oedema had the appearance of beriberi. Two had dental affections of filarial origin, the fourth had a retroauricular abscess and the fifth showed rheumatoid symptoms successively in various joints.

R. T. L.

**SMITH (Allen J.) & RIVAS (Damaso). Notes upon Human Filariasis (*Filaria loa* Guyot, and *Filaria bancrofti* Cobbold).**—*Amer. Jl. Trop. Dis. & Prevent. Med.* 1914. Dec. Vol. 2. No. 6. pp. 361–377. With 1 plate.

This paper records some observations upon two cases of *Filaria loa* and three of *Filaria bancrofti* that have come under the authors' notice during the past four years.

The cases of *Filaria loa* were contracted in the Cameroons. The first patient noticed symptoms of discomfort in the eye for the first time

six years after his return to Philadelphia. On examining with a mirror he saw a filaria worm traverse the eyeball in three to five minutes. Areas of cutaneous tenderness and swelling had appeared at intervals during and after his stay in the Cameroons. A male worm was removed from the eye and showed the characteristic cuticular bosses. There were two pairs of post-anal papillae and four pairs of preanals. In these and other characters the authors believe that their species differs from *Filaria loa*.

In the second case the embryos of *Filaria loa* had been recognised in the blood during a stay of 12 years in Africa and an adult worm had been extracted from the subcutaneous tissue of the upper anterior left chest wall. Calabar swellings were of frequent occurrence. The patient had choreiform movements of the head and complained of loss of memory and of mental fatigue. The blood showed a moderate anaemia. The red cells were 3,000,000, the white cells 8,000 per cubic millimetre. The haemoglobin was 72 per cent. and there was an eosinophilia of 7.06 per cent. The filaria embryos were markedly diurnal in the blood, rising from 5 at midnight to 531 at noon in measured equal drops of blood. Three cases of *Filaria bancrofti* briefly noted by the authors present little of novelty. Two were Porto Ricans.

Two useful notes upon technique are given. It was found possible to secure a concentration of the parasites in small areas by mixing two large drops of blood on a slide with one drop of sodium citrate 1 per cent. The mixture was then drawn out in a thick film over a restricted part of the slide, enclosed in a Petri dish with moist filter paper on the bottom and left in the incubator at body temperature for half an hour. The blood slowly clots and shrinks. In the clear citrated serum many of the embryos are found. In cases where the embryos in the blood are very few or apparently absent they may be detected by collecting 0.1 to 1 cc. of blood into 5 cc. of a two per cent. acetic acid solution. The mixture is gently shaken and then centrifuged. The embryos are found in the sediment.

The writers believe that the explanation or the periodical appearance of filarial embryos in the peripheral blood stream "will be found to rest in some form of mechanical operation." They maintain that "the period of their special discovery in the skin corresponds not with a period of relaxation of the capillaries, but rather with a period of contraction (and therefore of retention)." Experiments on the transmission of *Filaria bancrofti* by *Cimex lectularius* showed that the embryo invaded the tissues but did not undergo metamorphosis.

R. T. L.

**JOHNSON (F. B.). Filarial Infection.—An Investigation of its Prevalence in Charleston, S. C.—*Southern Med. J.* 1915. July. Vol. 8. No. 7. pp. 630-634.**

Of 400 individuals in the city of Charleston, S. C., 19.25 per cent. were found to harbour filaria embryos in the blood. In the majority of cases no symptoms are produced by the worms. Five per cent. of the cases showed symptoms of filariasis. The white race showed a higher percentage (23 per cent.) than the coloured (18 per cent.). The white females gave 28 per cent. of 50 cases examined.

R. T. L.

MORLOT & ZUBER. Néosalvarsan et *Filaria loa*.—*C. R. Soc. Biol.* 1914. July 31. Vol. 77. No. 27. pp. 475-476.

A patient who suffered from syphilophobia exhibited manifestations of the presence of *Filaria loa* every ten to fifteen days, especially in the eyes. During two months ten intravenous injections of neosalvarsan were given commencing with the minimum dose of 15 centigrammes and increasing each by 15 centigrammes. The last four injections were each of 90 centigrammes. The filaria completely disappeared and has not been seen during the last three months. Six weeks have now elapsed since the last injection.

R. T. L.

PINTO da ROCHA (Americo). Un Caso de *Filaria ocular*.—*Med. Contemporanea*. 1914. Nov. 29. Vol. 32. No. 48. pp. 379-380.

A female *Filaria loa* was extracted in May 1914 at the Hospital Militar da Estrella from the eye of a Portuguese who had been in Angola and the Congo between 1908 and 1912. The worm measured 25.5 mm. in length and was 450 $\mu$  in breadth. The blood showed an eosinophilia of 14.4 per cent. Calabar swellings were noted in the course of the infection.

R. T. L.

NICOLL (William). On the Migration of the Larvae of *Onchocerca gibsoni* through the Capsule of the Worm Nodule.—*Ann. Trop. Med. & Parasit.* 1914. Dec. 15. Vol. 8. No. 3. pp. 609-621.

BREINL had recently stated that the *Onchocerca* larvae could make their escape from the worm nodules and reach the exterior by piercing the skin. The author endeavoured to confirm these conclusions but without success. Larvae were never observed either in the water used, in the bandage applied or in scrapings of the skin over the nodules. It is however concluded that these observations do not vitiate the validity of BREINL's results. By placing freshly excised nodules in water it was ascertained that larvae migrated through the undamaged capsules into the water, usually in small numbers but occasionally in comparatively large numbers. [Breinl's positive results may have been due to contamination with freeliving nematodes. The author overlooks the recent records of the detection of *Onchocerca* larvae in the blood in human infections.]

R. T. L.

McCONNELL (R. E.). Dracontiasis or Dracunculosis: A Review.—*Jl. Trop. Med. & Hyg.* 1914. Nov. 16. Vol. 17. No. 22. pp. 337-340.

MIGNACCA (Pietro). *Filaria di Medina*.—*Studi di Med. Trop., Collezione di Pubblicazioni Scientifiche sull'Eritrea*. 1914. Vol. 1. pp. 149-153.

These papers contain no original matter. The chief facts known concerning the structure, transmission and pathological effects caused by the Guineaworm are summarised from the most accessible text books. McConnell refers briefly to a case in a European who was

infected apparently in the White Nile Province of the Sudan. [The occurrence of Guineaworm especially on the backs of Indian water carriers is again quoted, although there are good grounds for doubting the original observation. The statement has been repeatedly questioned and it would be useful if some Indian observers would make new inquiries on this subject.]

R. T. L.

**MUKERJI (J. G.) & DASS (Banarsi). Prevalence of Intestinal Parasites in the United Provinces.**—*Indian Med. Gaz.* 1915. June. Vol. 50. No. 6. pp. 205–206.

The stools of six hundred patients attending the King George's Hospital, Lucknow, were examined microscopically for evidence of parasites. A good number were taken indiscriminately but the others were selected as showing suspicion of a positive result. Forty per cent. were found to harbour intestinal parasites and of these nearly 27 per cent. were intestinal worms. There were 96 cases of ankylostome infection, 29 of *Ascaris lumbricoides*, 12 of *Trichocephalus trichiuris*, 18 of Tapeworm and 2 of *Oxyuris vermicularis*. The tapeworm records are based upon the ova, which were almost certainly those of *Taenia saginata*. A single specimen of a *Strongyloides* embryo was found once only in a Mohammedan.

R. T. L.

**FISCHER (Walter). Ueber Stuhluntersuchungen bei Europäern und Chinesen in Shanghai.** [Results of Examination of Faeces in Shanghai.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1914. Sept. Vol. 18. No. 18. pp. 615–634.

A systematic examination of the faeces of 202 persons at the *Deutsche Medicinschule für Chinesen* in Shanghai gave the following results:—

A. Healthy and sick Chinamen.

108 cases.

<i>Ascaris</i>	..	..	21
<i>Trichocephalus</i>	..	..	28
<i>Oxyuris</i>	..	..	1
<i>Ankylostomes</i>	..	..	4
<i>Clonorchis sinensis</i>	..	..	4
<i>Strongyloides</i>	..	..	2
<i>Taenia saginata</i>	..	..	1
<i>Schistosoma japonica</i>	..	..	1

B. Healthy and sick Europeans (three-fourths suffered from intestinal symptoms).

194 cases.

<i>Ascaris</i>	..	..	12
<i>Trichocephalus</i>	..	..	48
<i>Ankylostomes</i>	..	..	3
<i>Clonorchis sinensis</i>	..	..	3 (all half-castes).
<i>Strongyloides</i>	..	..	0
<i>Schistosoma japonicum</i>	..	..	0
<i>Taenia saginata</i>	..	..	Some cases.
<i>Dibothriocephalus latus</i>	..	..	1 (infected in Finland [?]).

R. T. L.



McNEIL (H. L.). Fifty Cases of Intestinal Parasites in Adults, with an Attempt to study some Symptoms caused by them.—*Southern Med. J.* 1915. June. Vol. 8. No. 6. pp. 486-493.

The author has been impressed by the following facts in the course of an inquiry made at the Southern Pacific Hospital, Houston, Texas :

- " First: Indefinite and unexplained abdominal pains or tenderness should make one suspicious of intestinal parasites. Parasites should be suspected in all cases of 'chronic or subacute appendicitis.'
- " Second: The adult negro is practically immune to hookworm infection, apparently, in this part of the country.
- " Third: Many apparently normal men, who harbor parasites, are subject to certain indefinite complaints, diagnosed usually as 'indigestion,' 'cramps,' 'biliousness,' 'mild diarrhoea,' 'malaria,' 'febricula,' 'grip,' etc., which are really symptoms of the parasitic infections.
- " Fourth: An otherwise unexplained eosinophilia is good evidence of parasitic infection, even though the parasites are not discovered at the first stool examinations, but an absence of eosinophilia does not rule out parasitic infection."

TABLE showing DISTRIBUTION of SYMPTOMS according to INFECTION.

	No. of cases.	Eosinophilia (over 4%)	Anaemia (marked).	History of Colics.	Abdominal tenderness.	Fever.	Chills.	Indigestion.	Diarrhoea.
Hookworm .. ..	19	18	9	6	4	5	2	3	2
<i>Taenia nana</i> .. ..	6	5	1	6	4	1	1	3	0
<i>T. saginata</i> .. ..	4	3	0	2	1	0	0	0	0
Pin worm .. ..	3	1	0	2	1	0	0	1	0
Whip worm .. ..	4	0	0	2	3	1	0	1	0
Strongyloides .. ..	2	2	1	0	2	0	0	0	2
Lambliæ .. ..	2	0	0	0	2	0	0	0	2
<i>Amoeba hyst.</i> .. ..	16	0	0	0	12	4	0	0	13
<i>Taenia solium</i> .. ..	1	1	0	1	1	1	1	0	0
<i>Cercomonas</i> .. ..	4	0	0	0	0	0	0	0	2
<i>Amoeba coli</i> .. ..	58	0	0	0	0	0	0	5	4
Mixed (whip worm, pin worm, and <i>Hymenolepis nana</i> ) .. ..	1	1	0	1	1	1	0	1	1
Mixed (hookworm and <i>Hymenolepis nana</i> ) .. ..	1	1	1	1	1	0	0	1	0
Mixed ( <i>Amoeba coli</i> and <i>Amoeba hyst.</i> ) .. ..	4	0	0	0	4	1	0	0	4

In the reply to the discussion on the paper, Dr. McNeil states that nervous symptoms did not figure largely, probably because most of the patients were adults.

R. T. L.

EYTINGE (E. O. J.). **Case Reports from Guam**.—*U.S. Naval Med. Bull.* 1914. Jan. Vol. 8. No. 1. pp. 116-123. With 2 plates.

Two of the cases reported are of interest to readers of this journal :—  
*Pseudo-fibroid of uterus*.—A Chamorro multipara, aged 42, was admitted to the Naval Hospital. There was a steady drip of blood from the cervix. On bimanual examination a mass the size of a child's head was found, springing from the fundus, hard, nodular, and moving with the uterus. A diagnosis of fibroid was made. There was the "regular round, whip, and hookworm infection met with in Guam." The bleeding diminished with rest in bed and on the following day the patient was cured. A week later there was no change in the tumour. "A vigorous course of thymol and santonin was begun. Some hundreds of round worms were passed and coincidentally the tumour disappeared, apparently having been a mass of round worms." The patient was discharged well.

*A Fatal Case of Ankylostomiasis*.—A Chamorro girl, aged 3, was admitted on November 4. The child had been ill for a long time with weakness and general swelling of the body. On admission there were general oedema and anasarca. The complexion was waxy. The stools showed a round, whip and hookworm infection. Blood examination—haemoglobin 25 per cent., red cells 1,070,000, white cells 11,000. Treatment with santonin and thymol was begun and pushed. Repeated doses of thymol as large as 2 drachms failed. The patient grew steadily worse and died on December 20th. The post mortem showed a typical picture of profound anaemia. "The upper part of the small gut was alive with hookworms, the entire wall being lined with them. . . . Thymol failed utterly."

A. G. B.

MATSUOKA (Y.). **On the Question of the Pathological Meaning of the Worms in the Vermiform Appendix**.—*Sei-i-Kwai Med. Jl.* 1915. Jan. 10. Vol. 34. No. 1. Whole No. 395. pp. 2-3. (The Original in No. 23. Vol. 28 of the *Jl. Tokyo Med. Assoc.*)

The author has endeavoured to determine whether the worms frequently present in the appendix are the cause of inflammation of this organ and if they can produce other tissue changes. Out of 103 appendices removed by operation 48 contained parasites or their eggs. In 29 (28·27 per cent.) these were oxyuris and in two the trichocephalus was present. In 33 cases of acute appendicitis oxyuris occurred three times while on 26 occasions this parasite was found in normal or not acutely inflamed appendices. In forty-five of the cases the appendix was quite normal and there was no sign of inflammation, although parasites were present in 25 instances and the diagnosis of appendicitis had been arrived at on clinical grounds. In 91·7 per cent. of those cases sent from the surgical clinic parasites were present. The author concludes that these helminths do not cause appendicitis although they induce symptoms which may be named *appendicopathia parasitaria* and are characterised by absence of fever and pain on pressure over the ileo-caecal region.

R. T. L.

EMRYS-ROBERTS (E.) & STEPHENS (J. W. W.). *Banana Débris in Faeces simulating Tapeworm Segments.*—*Jl. Path. & Bact.* 1915. Apr. Vol. 19. No. 4. pp. 486-487. With 1 plate.

From the washings of the rectum in a case of inoperable carcinoma a number of minute black bodies were obtained. These under the microscope showed a segmentation recalling that of the tapeworms. Their vegetable nature was established by the recognition in an isolated portion of two parallel rows of segments with an intermediary spiral fibre to which the rows were intimately connected by a stroma of cells. CAMMIDGE had previously figured banana debris as spurious *Hymenolepis nana*. When bananas were excluded from the dietary in the present case the passage of these curious bodies ceased.

R. T. L.

BURGE (W. E.) & BURGE (E. L.). *The Protection of Parasites in the Digestive Tract against the Action of the Digestive Enzymes.*—*Jl. Parasit.* 1915. June. Vol. 1. No. 4. pp. 179-183. With 3 text-figs.

From experiments on the tapeworms (*Taenia serrata*) and roundworms of the dog it was ascertained that these parasites are not digested when introduced into activated pancreatic juice so long as they remain alive, but are digested when dead. If any part be killed it is digested. By a series of ingenious experiments it was shown that by keeping the dead body of a roundworm constantly permeated with nascent oxygen it can be introduced into activated pancreatic juice without risk of digestion. The author concludes that the oxidative processes of the living parasites oxidise the enzyme solution in immediate contact with them and so enable the organisms to withstand the action of the digestive juices.

R. T. L.

PAULIAN (Démètre Em.). *Parasitisme et Eosinophilie.*—*C. R. Soc. Biol.* 1915. Apr. 30. Vol. 78. No. 7. pp. 155-156.

From experiments made upon guinea-pigs by injecting them with toxins derived from *Taenia cucumerina* [*Dipylidium caninum*], *Ascaris megalocephala*, *Oxyuris vermicularis* and *Trichocephalus dispar* the author concludes that these toxins sensitise the animal organism and the anaphylaxis causes the appearance of the eosinophile cells which defend the body against these toxins in the same way as the polynuclear cells protect it against microbes. The animals experimented upon reacted in the following manner: Their weight fell quickly in five days from 200 to 100 grams. The temperature rose immediately. The leucocytic formula was also affected. The number of polynuclear leucocytes rose in the first days, varying between 55 per cent. and 78 per cent., then fell to about 12 per cent. At the same time the mononuclear cells increased from 30 per cent. to 70 per cent. The lymphocytes also rose and an intense eosinophilia followed, rising from 2 per cent. to 44 per cent. and reaching its maximum on the third and fourth day after the injection, thereafter decreasing again. The daily injection was uniformly 3 cc.

R. T. L.

**ORME (William Bryce). Beta-Naphthol Poisoning occurring during the Treatment of Ankylostomiasis.**—*Brit. Med. Jl.* 1915. July 31. pp. 176–177.

The clinical features of a fatal case of Beta-naphthol poisoning are recorded and it is mentioned that two other cases have come under the author's notice. The patient received 30 grains of Beta-naphthol at 7 a.m., at 9 a.m. and at 11 a.m. on August 29th. On the following day the treatment was repeated. On August 31st, a first dose was administered at 7 a.m. Vomiting began shortly afterwards. At 6 p.m. the patient's temperature was 102·8° F. On the following morning vomiting continued. The urine was extremely dark and a slight jaundice appeared. The patient was much collapsed and died in the early hours of the next day. A sample of urine removed after death was highly albuminous and very dark. Before treatment the urine had been found to be acid with a specific gravity of 1,010 and cloud of albumin. The author concludes that in patients suffering from diseases of the kidneys Beta-naphthol should be used with the utmost caution, if at all.

R. T. L.

## FEVERS IN THE TROPICS AND DENGUE.

**BEVERLEY (E. P.) & LYNN (W. J.).** **The Reappearance of Dengue on the Isthmus of Panama.**—*Proc. Med. Assoc. Isthmian Canal Zone, Oct., 1912 to Mar., 1913.* Vol. 5. Part 2. pp. 32–42. With 2 charts.

An epidemic of 60 cases of a short duration fever diagnosed as dengue is described and full reports of four cases are given. The chief characteristics of this outbreak were, sudden onset of a pyrexia lasting three to eight days and severe frontal headache with aches in the limbs and back, apparently felt in the bones; the most typical pains had their seat in the knee joints; these were increased on walking, with at times excruciating pains in the back. The initial erythematous rash is associated with photophobia and injected conjunctivae, when the appearance is like that of a mild case of yellow fever. Glandular enlargements were common and the terminal eruption was found on the third to the fifth day in 60 per cent. of the cases. Convalescence was always very slow, and there were no complications. The chief interest lies in the differentiation from influenza, articular rheumatism, and malaria. The diagnosis was confirmed by a board appointed by the chief Sanitary Officer. In the discussion which followed, the fact that the disease had been so limited, in contradistinction to the usual rapid diffusion of epidemic dengue, was thought by some to throw a doubt on the diagnosis.

P. W. Bassett-Smith.

**DEEKS (W. E.).** **Case Reports on Six-Day Fever.**—*Proc. Med. Assoc. Isthmian Canal Zone, Oct., 1912 to Mar., 1913.* Vol. 5. Pt. 2. pp. 43–44.

This is a short note in which the author draws attention to the fact that in this fever the rash is more common than he at first reported. It follows the fall of the temperature, is petechial in character, confined to the extremities and is generally noticed on the sixth day fading away in one or two days. The cases differed from those described by BEVERLEY [see above] by the persistence and exact limitation of the fever, the differential blood count with marked leucopenia, and the enlargement of the spleen.

P. W. B-S.

**BREINL (A.), PRIESTLEY (H.) & FIELDING (J. W.).** **On the Occurrence and Pathology of Endemic Glandular Fever, a Specific Fever occurring in the Mossman District of North Queensland.**—*Med. J. of Australia.* 1914. Oct. 24. Vol. 1. No. 17. pp. 391–395. With 4 charts.

In 1910 SMITHSON called attention to this disease, which he called Mossman fever and in 1913 CLARKE described it more fully. Endemic glandular fever is defined as “an acute disease characterised by an irregular remittent fever of from three days to three weeks duration, accompanied by painless swellings of certain groups of superficial lymph glands, and by the appearance of a macular, or occasionally

vesicular, rash." The disease at different times has been confounded with filariasis and plague, though the mortality is practically nil. It affects both natives and whites of all ages in the endemic region. The incubation period is about six days, sometimes as long as ten. The onset may be sudden or gradual, the high fever lasting from three to ten days, when the temperature falls by lysis. The pulse is usually soft, of low tension and often dicrotic; headache is always present and bone pains are common. The axillary and inguinal glands are the ones generally affected; they are painful but never suppurate; as the fever passes off, the glands decrease in size rapidly but may at times persist for months. All the cases observed by the authors showed a well-marked rash at the commencement of the pyrexia, on the trunk, arms, and legs, occasionally on the face, persisting for two to four days, either macular or vesicular in character. Sweats and constipation are commonly noticed; relapses may occur. Three types are described, restless, drowsy, and chronic; 92 per cent. of the cases belong to the former type. In the second the appearance resembles that of typhoid; the drowsiness may deepen into coma and the patient die. One attack is said to give slight immunity; the mortality is less than 1 per cent. No definite etiological facts have been made out but the disease appears to be transmissible to monkeys by means of the peripheral blood (2 cases).

Though the disease is endemic in certain areas it is not contagious, for it does not spread in the wards of a hospital; it would however appear that those employed in manual labour are most frequently attacked. In the conclusions the authors state that the disease is in all probability transmitted by insects, but no proof is given and no parasites have been found in the peripheral blood.

P. W. B-S.

SUHR (A. C. H.). **A Note on Fevers resembling Sand-fly Fever at Singapore.**—*Jl. Royal Army Med. Corps.* 1915. Jan. Vol. 24. No. 1. pp. 49-51.

Shortly after his arrival at Singapore the author was impressed by the number of short fevers that simulated the phlebotomus fever of Malta; as however short fevers are frequently due to light malarial infections, the diagnosis is difficult. He had the opportunity of observing carefully a draft of men who arrived from home in 1912 and had never had malaria. He divides the fever cases among them into (1) Typical malaria with parasites; (2) Clinically malaria, but no parasites; (3) Cases probably of sand-fly fever with all the symptoms as recognised in Malta. Most of the latter were contracted at Pulan Brani which is almost free of malaria. Many small flies were caught for examination but so far not one has proved to be a phlebotomus.

P. W. B-S.

KERSTEN (H. E.). **Die pockenverdächtigen Erkrankungen in Rabaul im Februar 1914.** [A Doubtful Case of Small Pox in Rabaul [New Pomerania].]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1914. Oct. Vol. 18. No. 20. pp. 691-697. With 1 text-fig. & 4 curves.

A native who had been employed unloading a ship from Sydney developed a febrile disease with a pustular eruption very like that of

smallpox, which was later followed by a second darker eruption leaving no scars. Three other cases suffered from vesicular eruptions about the same time. To clear up the diagnosis each case was inoculated with animal lymph in one arm and human lymph in the other. In the first case the results were entirely negative; the others showed well marked vaccinia vesicles, the results pointing to the first being smallpox and the others varicella. The author thinks that the first case had a double infection of (1) the disease derived from Sydney, which owing to its slight contagiousness and low mortality (2 per cent.) he believes not to be true variola but a disease *sui generis*, and (2) Chicken pox similar to the other three men.

P. W. B-S.

DOWDEN (R.). **A Suspected Case of Kedani River Fever in the Federated Malay States.**—*Indian Med. Gaz.* 1915. June. Vol. 50. No. 6. pp. 208-211.

In 1910 SANDWITH noted that this fever was restricted to Japan. Lately SCHÜFFNER from 150 cases describes a similar disease in Deli, Sumatra, under the name of Pseudo-typhus [see this *Bulletin*, Vol. 5, p. 360], and ASHBURN and CRAIG recognised it in the Philippines. The author describes a case in detail from the Malay States. The patient was a European aged 20, who had lived there for over two years with good health except for slight attacks of malaria. After being ill for fourteen days he was admitted to hospital, when his appearance was like that of a typhoid in the third week. The rash came out on the eighth day, it was profuse and became haemorrhagic, and was accompanied with some glandular swelling and neuralgia. On the twentieth day a rash like that of a secondary syphilide appeared which lasted forty-eight hours. The case was complicated by pneumonia and a gluteal abscess following a quinine injection. Only symptomatic treatment was used and after the disease had lasted a month recovery set in. Most of the symptoms were like those of the Deli cases, but the blood picture showed no marked alteration. No etiological information is given.

[WEIR, H. H., describes a similar disease in Korea, this *Bulletin*, Vol. 5, p. 361].

P. W. B-S.

NOC & GAUTRON. **Deux cas de fièvre indéterminée rappelant le pseudo-typhus de Delhi observés à Saigon.**—*Bull. Soc. Med. Chirurg. Indochine.* 1915. Feb. Vol. 6. No. 3. 8 pp.

In the autumn of 1914 the authors observed two cases of obscure fever in Europeans at the Military Hospital, Saigon. The fever was accompanied by a roseolous eruption on the body and limbs, a superficial small area of necrosis of skin, enlarged glands, pulmonary congestion, and marked nervous symptoms. The cases were very similar to those seen by SCHÜFFNER at Deli [this *Bulletin*, Vol. 5, p. 360] and like them failed to give any serum reactions for typhoid and para-typhoid. A similar disease has been observed in the Philippines and Japan but no cases have been recorded previously from Cochin China or Cambodia. One of the cases was fatal; though an autopsy was made it did not give any important information.

The second recovered ; the temperature curve was like that of typhus, falling by lysis to normal about the 14th day. The eruption on the face is always absent or scanty, blood cultures are negative, and there is an early polynuclear increase with a lymphocytosis later ; eosinophiles are absent. The cases show many points of resemblance to the pseudo-typhus of Deli and the "River Fever" of Japan, yet differ only so slightly from true typhus that the authors are not able definitely to classify them.

P. W. B-S.

CROHN (B. B.). *Rat-Bite Fever.*—*Arch. Intern. Med.* 1915. June 15. Vol. 15. No. 6. pp. 1014-1039. With 1 chart.

Very little is known of this uncommon disease. The author has provided a most excellent and complete resumé of all the reported cases, to which he adds a full description of one of his own. The disease has been observed in Japan, America, Great Britain, France, and Italy but not in the German Empire. Agriculturists and sailors have been most frequently affected. The disease occurs at any age, but generally in adults. The bite is nearly always described as caused by a large brown or black rat, never by tame white rats ; little is known as to the condition of the animal which has caused the lesion as the original bite generally heals up at once. The wound has been in the face and head or upper extremity in 47 out of the 52 cases. The incubative period averages twelve days ; this is followed by chills, fever, induration, and discolouration of the wound, and lymphatic inflammation. After one or two days there is a bluish red rash which lasts as long as the fever, nervous symptoms are marked, and nephritis is a common complication. The paroxysm lasts about four days. There may be only one attack or as many as twenty recurrences, usually about ten. A slow convalescence is generally made, but fulminating cases fatal in a few days have been described, death then being due to nephritis. The mortality rate of the 52 cases was 10 per cent. As to the nature of the cause of the disease we are still in the dark ; no parasitic bodies have ever been found in the blood except by OGATA, whose observations are not yet confirmed. There are many points which favour a spirochaete infection similar to that of relapsing fever ; it may be noted that salvarsan when used acted favourably and PROESCHER and OGATA were able to infect successive generations of guinea-pigs. Another theory is that the symptoms are the result of a powerful neuro-toxin locally created ; a case of BANKERS favours this view, as in this patient there was permanent atrophy and paralysis of the arm following a bite on the hand of the same side. The original paper should be read by all interested in the subject.

P. W. B-S.

CHAGAS (Carlos). *Verificação no Rio de Janeiro da molestia Sokodú (Rattenbisskrankheit) devida á mordedura de rato.* [Occurrence in Rio de Janeiro of a Case of Rat-Bite Disease.]—*Brazil Med.* 1915. July 22. Vol. 29. No. 28. pp. 217-220.

A report of a typical case of rat-bite disease in a boy aged 10 years, being the first to be recognised in Brazil. The patient was still under



observation at the time of writing. The greater part of the paper is occupied by a systematic account of the disease, and its treatment with neo-salvarsan, such as will be found in most of the text-books.

J. B. Nias.

PERUGIA (A.) & CARCHIDIO (U.). *Le Malattie da Morso di Topo* (Sokodu-Rattenbisskrankheit). [Rat-bite Fever].—*Riforma Medica*. 1915. Feb. 27. Vol. 30. No. 9. pp. 229-232; Mar. 6. No. 10. pp. 256-260.

An account of a case of rat-bite fever, being one of the first to be recognized in Italy.

The patient was a male, aged 54, who was bitten on the index finger of the right hand by a rat on the 1st of May 1914. The bite appears to have been trifling and to have healed quickly. After an interval of ten days, tenderness and throbbing were felt at the seat of the injury and a small vesicle appeared filled with bloody serum. Symptoms of general malaise quickly followed, with engorgement of the lymphatics of the right arm and a high temperature, and on the 3rd June the patient took to his bed. The finger was then found to be generally inflamed, without any trace of fluctuation, the skin being yellow in tint with small areas of desquamation. The pain was not so severe as might have been expected. The fever continued to present an intermittent character until the 18th of July, i.e., for nearly seven weeks, and then began to subside, and from the 1st to the 6th of August the patient appeared to have entered upon the stage of convalescence. On the 7th of August, however, all the symptoms reappeared with increased severity and were this time accompanied by albuminuria with swelling of the legs and pain in the bones and joints. This second phase of the illness lasted until November 4th when recovery was complete. Treatment was initiated with quinine, salicylic acid, arsenic and atoxyl without any benefit. Finally, on a date not stated, an injection of 30 centigrammes of neosalvarsan was given into the muscles of the buttock, and this produced improvement. A second injection of neosalvarsan was then given endovenously [date and amount not stated], which promptly terminated all the symptoms. A considerable number of estimations of the eosinophiles in the blood were made in the course of the illness, with results that are stated in the text.

Those who are specially interested in the subject of rat-bite fever would do well to consult this paper, as it gives a very fair account of the bibliography of the subject.

J. B. N.

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## PAPPATACI FEVER.

BIRT (C.). **Phlebotomus or Sandfly Fever.**—*Brit. Med. Jl.* 1915. July 31. pp. 168-169.

The author deals with the subject in his usual masterly manner. After a short description of the symptoms of the disease he shows that the susceptibility of British troops is very high and gives figures to show that the duration of the fever is rather longer in India than in Malta; in the former it lasts for six days in 20 per cent. of cases whereas in Malta the percentage is only 9. Ninety-five per cent. of all cases occur in people who have resided two years or less in the endemic area, and a high degree of immunity is afforded by the fever. In malarial climates it was and still is often confounded with malaria, but though the onset may be attended by a chill there is never the severe rigor experienced in malaria. He states that since five or six thousand attacks of sandfly fever occur annually among the European and Indian troops the amount of quinine which has uselessly been expended is enormous. He quotes a memorandum issued in 1913 in India in which very thorough instructions are given for the examination of all cases of fever to differentiate the various forms; this method might with advantage be carried out elsewhere. He gives figures showing the increase of admissions for this fever in India due to better diagnosis. In 1910 there were 512, in 1912 it had risen to 2,163 among 71,000 European troops. There is a close correlation between the number of sandflies and the fever; in Poona the flies are scarce and cases are few, in N.W. India they are abundant and the fever is prevalent. Since the knowledge of the disease has been acquired the incidence of the fever in Malta among the British troops has been reduced from over 300 in 1908 to 104 in 1912. This improvement is largely due to Col. Birt's own labours.

P. W. Bassett-Smith.

HOUSTON (J. W.). **Sandfly Fever in Peshawar.**—*Brit. Med. Jl.* 1915. July 31. pp. 170-172.

In the Peshawar district sandfly fever has been long known to be endemic. The author shows that newly arrived forces suffer twice as much as those who have been on the station for some time and that the infection appears to cling to certain bungalows and barracks, the maximum incidence being in May and June. Both *P. papatasi* and *P. minutus* are found; the former is however the most common, the relative proportion being 20 to 1.

Besides the ordinary three day fever a second longer type, resembling the seven day fever of the coast towns, occurs in the summer months and is attributed by some to the presence of sandflies.

In this the symptoms are less severe and a rash is sometimes seen; it differs from dengue in being more sporadic in appearance and much less epidemic in character, and by the mildness of the symptoms. It is noted that *Stegomyia* are present and may possibly be carriers of this type of fever.

P. W. B-S.

GRAHAM (G. F.). **Sandfly Fever in Chitral (N. India).**—*Brit. Med. Jl.* 1915. July 31. pp. 169–170.

During 1911–1913 the author made observations on 700–800 cases of this fever in Chitral. The disease was first described by McCARRISON in 1906 as “three day fever,” but it has long been known in other parts of India by local names. This fever is prevalent in the whole of the Peshawar Chitral Valley up to 7,000 feet; above that level the sandfly cannot live and breed. It is limited to the summer months between May and September, and a very dry season appeared to be most favourable to its spread. The most favourable temperature for the imago to hatch out is 70° to 80° F. In Chitral, Europeans and Gurkhas suffer most (60 to 80 per cent.); the troops that have lived previously in the plains of the Punjab being almost immune. For diagnosis the relatively slow pulse and leucopenia are important signs. The author emphasises the fact that, though the disease causes a very distressing type of fever for two or three days, out of his 700 cases he has not noticed any lasting ill effects; recovery is absolute, and a marked immunity is given by one attack.

P. W. B-S.

GABBI (U.). **Ueber den Werdegang des Auftretens und der Verbreitung des dreitägigen Fiebers in Ostsizilien sowie in Unterkalabrien.** [The Mode of Origin and Spread of Three Day Fever in East Sicily and Lower Calabria.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1915. May. Vol. 19. No. 6. pp. 160–170.

The author has already written much on the subject in various journals which have been reviewed; in this paper he restates his observations and conclusions. He attributes the introduction of the fever into Sicily and southern Italy to the large quantities of wood brought from Herzegovina, Dalmatia and Istria in order to build temporary dwellings for the inhabitants after the earthquakes. He assumes that either the phlebotomus or its larva containing the disease germ were conveyed in the wood and, as the duration of the voyage is only from 50 hours to 9 days, it was quite possible for the flies to survive and carry the infection, which when once introduced is quickly spread if breeding places for the phlebotomus are present.

An active crusade against the insect would rapidly eliminate the disease.

P. W. B-S.

PELLEGRINO (P. L.). **Su la febbre da pappataci o febbre dei tre giorni.** **Definizione, Etiologia, Patogenesi, Profilassi.**—*Malaria e Malat. d. Paesi Caldi.* 1915. May-June. Vol. 6. No. 3. pp. 143–155.

The author gives an historical survey of our knowledge of three day fever, or as he prefers to call it “Febbre da pappataci” a name which definitely associates the disease with the fly known to carry the infection, and distinguishes it from dengue which is “una febbre da culex.” He draws attention to the danger of the ambulant forms and to the protection given by previous attacks. Meteorological conditions undoubtedly to a certain extent determine the amount of prevalence

of the disease in endemic areas, as is found in other insect carried infections. Spraying buildings with formalin may kill off the flies, and rubbing the body with ointments containing boric acid, zinc, oil of eucalyptus, and oil of verbena may have a certain protective influence, but the only reliable prophylactic measure is to destroy the breeding places of the flies.

P. W. B-S.

GIUGNI (Francesco). *La febbre dei tre giorni o febbre da pappataci*.—*Riv. Crit. di Clin. Med.* 1915. Feb. 20. Vol. 16. No. 8. pp. 120-125.

The history, etiology, course, and treatment of "three day" or "pappataci fever" are given very fully, but no new facts are recorded. Clinically three variants from the typical fever are described: (1) An apyretic type with the symptoms but no fever. (2) An attenuated or abortive type in which the duration is short and the symptoms slight. (3) A prolonged type; this is rare in the Mediterranean, more common in India. For prevention of epidemics the author concurs in Prof. GABBI'S views.

P. W. B-S.

MARETT (P. J.). *The Bionomics of the Maltese Phlebotomi*.—*Brit. Med. J.* 1915. July 31. pp. 172-173.

The Maltese phlebotomus requires for its development some warm, dark, rather damp, quiet position, the interstices of walls and crevices in caves and old buildings being their favourite haunts, and the most favourable temperature is about 70° F.; below 60° the larvae roll up; if the air is too dry they shrivel. The larvae are however difficult to find as they bury themselves in the excrement of wood lice, etc., on which they feed. Three species have been described from Malta by NEWSTEAD, *P. papatasi*, *P. minutus*, *P. perniciosus*. They commonly appear in May, are most numerous during August, and disappear in December or early January; during the first four months of the year only larvae are found as the fly is stated not to hibernate. A table is given setting out the length of life of the different stages, for both the wild and tame (laboratory reared) flies. Four generations of the latter were bred out from the middle of August to the end of March. When the larvae is about to pass into a pupa, if the detritus in which it lives is not too dry, it comes to the surface; if it is dry the fly on leaving the pupa has to work its way to the surface. It is sexually mature within a few hours after emerging, the females only sucking blood which they generally do before pairing. After about seven days the wild fly lays its eggs and then dies, tame flies may live much longer (25 days). The flies are nocturnal, dislike sunlight, but are attracted by artificial light; as they do not fly high they are rarely found in upper rooms. A mite which hatches out in the wood louse excreta is found as a common ecto-parasite and does not appear to be harmful but a minute pseudo-scorpion injures the larvae. The author gives a short description of a fungus, *Empusa papatasi*, which is pathogenic to the fly, and may possibly produce symptoms of diarrhoea in children bitten by the diseased flies.

P. W. B-S.

# VERRUGA PERUVIANA AND OROYA FEVER.

STRONG (R. P.), TYZZER (E. E.) & SELLARDS (A. W.). **Differential Diagnosis of Verruga Peruviana. (Fifth Report).** From the Harvard School of Tropical Medicine, Boston.—*Jl. Trop. Med. & Hyg.* 1915. June 1. Vol. 18. No. 11. pp. 122–125.

The points differentiating verruga from framboesia, syphilis, and Oroya fever are very clearly put forward. It is stated that the unity of the two diseases, Oroya fever and verruga, is still held by some in the endemic area, chiefly on the old record of CARRION's experiment. The authors obtained a volunteer who was inoculated with verruga lesions from two cases. This caused none of the blood changes constantly found in Oroya fever but produced a local infection of verruga after a period of sixteen days. Part of the lesion removed from the case was inoculated into the testis of a rabbit and this animal gave typical results of verruga in twenty-five days; the other part was subjected to histological examination, and a section was found to be similar to other human verrugas that had been examined. This experiment proved that direct inoculation of verruga from man to man does not cause Oroya fever but a modified verruga infection, analogous to the results found in smallpox inoculations. The disease is differentiated from yaws very definitely by the absence of spirochaetes in the lesion and by the results of treatment with salvarsan, as well as by the histological structure of the external evidences. The relationship of verruga to BASSEWITZ's disease\* found in Brazil is still under consideration, but undoubtedly they are very closely related.

P. W. Bassett-Smith.

STRONG (R. P.) & TYZZER (E. E.). **Pathology of Verruga Peruviana. (Sixth Report) from the Harvard School of Tropical Medicine.**—*Amer. Jl. of Trop. Dis. & Prevent. Med.* 1915. Apr. Vol. 2. No. 10. pp. 615–626.

Following up the previous work the authors now describe minutely the histo-pathological characters of the verruga lesions found by them and by previous workers. They first point out that the belief usually held that internal lesions are common is not correct, and that these statements have been due to errors in diagnosis caused generally by tubercular disease occurring concurrently with verruga or alone. Recently da ROCHA LIMA and COLE have carefully examined and described the verruga nodules in man and animals, but the authors believe that these observers have been led into errors by drawing conclusions from data supplied by a study of an insufficient number of cases. "The verruga nodule constitutes a special form of granuloma characterised in the early stages by the formation of new blood vessels in oedematous connective tissue, and by marked proliferation of the angio-blastic cells forming masses or islands of closely placed cells; by the invasion of the connective tissue by

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\* "Angiofibroma cutis circumscriptum contagiosum," described with a photograph in *Archiv. f. Schiffs- u. Trop.-Hyg.*, 1906, Vol. 10, pp. 201–219. A short description is given in CASTELLANI & CHALMER's Manual.

lymphocytes, plasma cells, and leucocytes, and as the lesion progresses by the formation of fibro-blasts and the deposit of collagen fibrils." In different tumours the appearance may resemble that of a fibro-sarcoma, myxo-sarcoma, or an angioma. No giant cells were found and no protozoal or other micro-organisms could be detected in unbroken nodules. BASSEWITZ's "Angiofibroma cutis circumscriptum contagiosum," if not identical with verruga peruviana, is a very closely allied disease, but further observations are required.

P. W. B-S.

TOWNSEND (C. H. T.). **Progress of Verruga Work with *Phlebotomus verrucarum*, T.**—*Jl. Econom. Entomol.* 1914. Oct. Vol. 7. No. 5. pp. 357-367.

In continuation of previous experiments on the transmission of verruga and Oroya fever by a species of phlebotomus found in the verruga zone and called by him *P. verrucarum*, the author describes a series of experiments with monkeys, dogs, rabbits and guinea-pigs, which were either subjected to the bites of living flies, or injected with emulsions of their macerated bodies. His views as to the duality of the two diseases are in direct opposition to those of STRONG, and the experiments appear to be without efficient controls. It is notable that he obtained 100 per cent. positive findings of Bartonella bodies in the animals treated, but, as he states, a prolonged search, taking from a few hours to whole days, might be necessary to find a single body and these are only present during the first three days. In the case of several animals in which nodules were not produced, the conclusion is given that they have small susceptibility and that the organisms were phagocyted, but no proof of this is given. The conditions produced in some cases were due to other infections, for one dog developed an enormous abscess. Though the author has devoted great labour and time to the subject, his conclusions are not convincing that the bodies observed in the blood of the animals were the same as those found in man, or that the phlebotomus is the transmitter of verruga.

P. W. B-S.

TOWNSEND (Charles H. T.). **Two Years Investigation in Peru of Verruga and its Insect Transmission.**—*Amer. Jl. Trop. Dis. & Pr.vent. Med.* 1915. July. Vol. 3. No. 1. pp. 16-32. With 2 plates.

In this paper the author maintains his belief in the unity of Oroya fever and verruga and the transmission of the disease by a night biting fly, the *Phlebotomus verrucarum*. He describes again the experimental evidence from animals and man which he has given in detail previously and he makes out a very good case for the Phlebotomus being the active carrier, but the experimental proof of the identity of the two diseases is not convincing. He admits that the clinching experiment with the seaman McGuire could not be carried out as originally intended, but *had it been done* a complete transmissional demonstration would have been secured.

The habits of the phlebotomus are very similar to those of the European species, living in damp soil rich in nitrogenous materials, removed from light in recesses of rock, walls and caves. The local loose rock or rubble wall furnishes ideal places for the flies to develop. They do not fly far, their greatest activity being between six and nine o'clock in the evening, and they are in greatest seasonal abundance during the height and close of the summer rains. As has been noticed elsewhere they feed upon lizards which frequent the same localities. He notes that were it not for the disease, the verruga zones in the Andes are climatically almost perfect and if freed from verruga, uta, and malaria, which he states are all insect-borne diseases, would form an immense region pre-eminently adapted for sanatoria.

P. W. B-S.

- GOMEZ (Maximo E.), i. **Epidemiologia de la enfermedad de Carrion en las provincias de Yauyos e Cañete. Contribucion al estudio de la geografia patologica de la verruga.**—*Cronica Med.* Lima. 1913. Oct. 31. Vol. 30. No. 596. pp. 419-421; 1914. Mar. 15. Vol. 31. No. 605. pp. 75-77; Mar. 31. No. 606. pp. 85-90.
- ii. **Epidemiologia de la enfermedad de Carrion.**—*Ibid.* Apr. 15. No. 607. pp. 100-102; Sept. No. 615. pp. 278-281; 1915. Jan. Vol. 32. No. 619. pp. 10-16.

These two papers are principally concerned with details of purely local interest as to the present-day distribution of Carrion's disease in Peru. In the first one, however, the author gives in addition an interesting account of how he and his brother both contracted the disease, as the result of passing a single night, in the course of a journey, in a locality known to be infected. It seems to be the general experience of travellers in Peru that the disease may be contracted in this way, whilst passage through the same localities in the day-time is perfectly safe. Epidemics occurring among gangs of labourers engaged on engineering works, may, for the same reason, be cut short by the issuing of mosquito curtains, or by removal to other sleeping quarters at the end of the day's work. All these facts point to the disease being conveyed by the bite of some nocturnal insect, possibly a mosquito; but nothing further, it is stated, has been ascertained in this direction up to the present time.

J. B. Nias.

- REBAGLIATI (Raul). **Enfermedad de Carrion. Inclusiones celulares en los organos hemopoieticos y en los elementos cutaneos de la verruga.** [Cellular Inclusions in the Haemopoietic Organs in Carrion's Disease and in the Cutaneous Tumours of Verruga.]—*Cronica Med.* Lima. 1915. Feb. Vol. 32. No. 620. pp. 36-38.

A description of certain microscopic appearances found in the tissues in cases of Carrion's disease, and in verruga. The paper is not illustrated in any way, and seems to be only of the nature of a preliminary notice. Further analysis of it therefore appears to be unnecessary.

J. B. N.

## MALARIA.

BARBER (M. A.), RAQUEL (Alfonso), GUZMAN (Ariston) & ROSA (Antonio P.). *Malaria in the Philippine Islands. II. The Distribution of the Commoner Anophelines and the Distribution of Malaria.*—*Philippine Jl. Sci.* Sect. B. Trop. Med. 1915. May. Vol. 10. No. 3. pp. 177-247. With 2 plates and 1 text-fig.

As the authors remark, this paper is based on work which is the logical sequence of that of WALKER and BARBER, whose report was reviewed in this *Bulletin*, Vol. 5, pp. 337-9. The object was to study more minutely the distribution of the commoner anophelines of the Archipelago and the distribution of endemic malaria, as determined by the parasite and spleen indexes of children, for the most part ten years and less of age. In short, the aim has been to establish a scientific basis for combating malaria in the Philippine Islands.

In the study of the distribution of anophelines the method was to collect the larvae and breed them out for identification. *Anopheles rossii* is by far the most abundant and widely spread. *A. febrifer* and *A. barbirostris* come next in order of abundance, though the former is more restricted in habitat than the latter. *A. sinensis* probably ranks fourth, though its relative abundance is difficult to estimate, as it is preferably a rice-paddy breeder. *A. maculatus* is probably the least plentiful. *A. rossii* and *A. febrifer* have been found in nearly every locality and *A. rossii* is by far the most adaptive, having been found in the very salt water of evaporating ponds used in obtaining salt and in brooks flowing from springs. *A. barbirostris* is widely distributed, but is less often found in foul water and is commonest where the water is comparatively fresh and aquatic plants are abundant. *A. febrifer* is more restricted in habitat and has never been found in brackish water. It shows a decided preference for clear flowing water, especially where there is abundance of overhanging grass, roots or other vegetation at the margin. It prefers brooks and small streams to large rivers. The two localities where *A. febrifer* has been found most abundantly are two small rivers—one in southern Mindoro and one in Negros. In the latter locality, a clear brook with steep banks and much vegetation, sometimes between 100 and 200 larvae could be taken up at one dip of a small collecting pan. *A. maculatus* has been found in the same sort of habitat as *A. febrifer*, but is far less common and much more restricted to very fresh water. *A. sinensis* appears to occur in about the same sort of locality as *A. barbirostris* but is much less frequently found.

A good deal of information regarding the habits of these mosquitoes, especially with reference to their visiting habitations and attacking human beings, has been collected. *A. febrifer*, like *A. rossii*, is a house-seeking species and readily attacks human beings. The flight of *A. febrifer* may be as much as 170 paces, although comparatively few got so far.

In studying the distribution of malaria in a locality both the parasite and the spleen indexes were taken by the examination of school children, the majority of whom were from 5 to 10 years of age. The

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NOTE.—In the absence of Dr. A. BALFOUR, C.M.G., this Section is being undertaken by Dr. WENYON.



examinations were made during school hours. For blood examination the thick film method was largely depended upon, the thick films being stained for one hour without previous fixation in jars containing Giemsa-Romanowsky stain, 1 part in 40 parts of water. The results of the examinations are given in a long table which shows a parasite index of 11 and a spleen index of 13.3. This rate is probably higher than for children generally, since so many malarious localities were included. If only one town, Magdalena, is omitted from the list the parasite index falls to 6.8. The authors come to the conclusion that a spleen rate of over 10 indicates present or past malaria in most, if not all, the communities of the Philippines. However, they would not recommend that the malarial survey of a locality should rest on the spleen examination alone. In the town of Magdalena the children were examined on three occasions, with intervals of four and three months. As a result the percentage of infected children was as high as 72.4, and the authors think that repeated examinations of the children of this town during two years would give nearly 100 per cent. of positives.

Some experiments were made with a view to testing the effect of larvicides on streams. It was useless merely to throw it on the surface of the stream and allow it to float down, but it had to be distributed along the margins and worked in mechanically. For this purpose the best method was to use a can provided with a long spout and to work in the larvicide by means of brooms of stiff twigs. A practical application of the method was made by Dr. DILLER on the Calamba Sugar Estate, with the result that a diminution in the number of mosquitoes and the cases of malaria was noted.

The authors write that they believe that the destruction of larvae by larvicides, and where practicable by the abolition of breeding and lurking places, offers more encouragement than any other antimalarial measures in the Philippines.

The authors' general summary is as follows:—

"1. The commonest species of *Anopheles* in the portion of the Philippines covered by our survey are *A. rossii*, *A. febrifer*, *A. barbirostris*, *A. maculatus*, and *A. sinensis*. It is probable that these are the commonest species of anopheles over the whole Archipelago.

"2. The results of this work and that of the work of Walker and Barber indicate that *Anopheles febrifer* and, to a less extent, *A. maculatus* are the chief transmitters of malaria in the Philippines.

"3. *Anopheles febrifer*\* is a stream breeder widely distributed and often recurring abundantly in the breeding places. It seeks houses and readily bites human beings.

"4. The distribution of malaria in the Philippines, as indicated by nearly 7,000 examinations of spleen or blood of school children, is by no means universal but is most abundant in such regions as afford breeding places for *A. febrifer* and *A. maculatus*.

"5. Antimalarial measures should be based upon a thorough anopheles and malaria survey, and those measures should be employed which will best meet the conditions. The best single measure is the destruction of larvae of malaria carriers, and in this work the breeding places of the stream breeders should receive first attention.

"6. Our own experience and that of others in the destruction of stream breeders by means of larvicides leads us to believe that this measure is a practical one in the Philippines and that it is within the means of many malarious communities in the Archipelago to reduce the amount of malaria by this measure."

C. M. Wenyon.

\* See note by LUDLOW, p. 338.

**MRTZMAIN (M. Bruin).** *Anopheles as a Winter Carrier of Plasmodium. The Mosquito as a Prophylactic Indicator.*—*U. S. Public Health Reps.* 1915. July 16. Vol. 30. No. 29. pp. 2117–2121.

The study was undertaken at Scott, Miss., on the property of the Mississippi Delta Planting Co. with the object of determining the possibility of hibernating mosquitoes carrying malaria over from one season to another. The period of observation was from February 3 to June 1, 1915. The anopheline mosquitoes were found under the floors of the dwellings in February, but in March few were found there and more were collected from the woods. It was at first attempted to catch only those at rest in their hibernating habitat, but this proved impracticable, so that eventually a horse was used as an attraction and the anopheles were then more readily captured.

As regards hibernation this does not truly occur in this region, for occasional sporadic flights and feeding prevail, as happened between Feb. 11 and 14, when a rise of 11° in temperature occurred. This rise resulted in a general house infection. During the three months Feb. 9 to May 9, 1,000 anopheles were dissected and no plasmodial infection noted. It cannot be determined absolutely that all these mosquitoes were of the autumn brood, but observations of the breeding places would support the view that till the latter part of April this was so.

Another series of observations was conducted on mosquitoes collected from negro cabins in which malarial gamete bearers were known to exist in the autumn. Eight such cabins were selected. Blood examinations made just prior to the mosquito dissections showed that at least six of these persons harboured gametes while in the two remaining only asexual forms were found. The cabins of the six gamete bearers yielded numbers of anopheles from May onwards. In one instance 24 *Anopheles quadrimaculatus* were removed engorged from the net of one man. The mosquitoes were kept till the digestion of the blood was sufficiently complete for dissection. More than 1,100 anophelēs were examined during 20 days, and on May 15 two were infected with oöcysts, while a third was found infected on May 26. The bearing of this result would be that prior to the finding of infected mosquitoes the treatment by quinine of all human carriers would prevent the anopheles becoming infected.

The author's paper is merely a preliminary note pointing out the scope of the investigations which are being undertaken and are likely to yield most interesting results.

C. M. W.

**CARTER (H. R.).** *Notes on Anopheles Production from a Malarial Survey.*—*Amer. Jl. Trop. Dis. & Prevent. Med.* 1915. June. Vol. 2. No. 12. pp. 753–758.

The author gives an illustration of the different conditions under which *Culex* and *Anopheles* breed. A stream running for 3 or 3½ miles through a ravine received at its upper end a sewer. The stream gradually cleared till it again became contaminated by another sewer entering two miles below its origin. The stream was fed at many places by marshy effluents from springs 50–200 feet distant. *Anopheles* were breeding in numbers in these effluents of clear water and in the

water of the main stream where it was clear just above the entrance of the second sewer. In other places in the upper part of the stream and below the entrance of the second sewer where the water was contaminated there were *Culex* in abundance, but no *Anopheles*. Other illustrations of the preference of *Culex* for foul water are given.

Some evidence is brought forward to show that *Anopheles punctipennis* develops later in the season and in colder weather than *A. quadrimaculatus*. The former is not considered an efficient malaria carrier.

In certain places water showing *Anopheles* larvae did not produce mosquitoes for various reasons. Such places are called incomplete breeding places and result from the destruction of the larvae by fish or other causes, or from the removal to another place of the eggs or larvae, which completed their development there. In the latter case the place from which the eggs or larvae are removed and the place in which development is completed are both incomplete breeding places, whereas taken together they constitute a complete breeding place.

C. M. W.

WRIGHTSON (Wm. D.). **Mosquito Eradication and Prevention. With Special Reference to the Malaria-bearing or Anopheles Mosquito.**—*Amer. Jl. Trop. Dis. & Prevent. Med.* 1915. June. Vol. 2. No. 12. pp. 738-752. With 9 figs.

As the title indicates, this paper is an account of the methods of mosquito eradication and prevention. The subject is considered under the headings of Quinine Prophylaxis, Screening, Control of Carriers, Clearing of Vegetation, Filling, Oiling and Drainage. One or two points may be noted here. Mosquitos resting on the ceiling of rooms may be caught by holding below them a can with some kerosene in it fixed to a broom handle. The mosquito will fall into the can. Vegetation should be cleared close to the ground, preferably to within 500 yards of dwellings, so as to afford less shelter for mosquitoes and to disclose small, hidden breeding-places. For oiling crude oil direct from the wells of Tampico was first employed. This is too thick for use so that another preparation was used. For this purpose 150 gallons of crude carboic acid (specific gravity not greater than 0.97) is heated in a tank; 200 pounds of powdered resin is dissolved in the acid, and then 30 pounds of caustic soda dissolved in 6 gallons of water. The mixture is stirred while heated and is ready for use in a few minutes. In the drainage section earth drains, subsoil or tile drains, blind drains and concrete drains are all considered.

C. M. W.

VON EZDORF (R. H.). **Malaria in the United States. Its Prevalence and Geographic Distribution.**—*U.S. Public Health Repts.* 1915. May 28. Vol. 30. No. 22. pp. 1603-1624.

The information upon which this report is based was collected by the sending out of circular post cards to physicians and of a circular letter to all State Health Officers in the United States. The result of the inquiry is shown in a table. Replies by card were received from

13.25 per cent. of the recipients. The cases of malaria reported numbered 81,085, representing a morbidity rate of 5.36 per thousand amongst the estimated population of 15,112,970. Calculating on the basis of complete returns the number of cases would have been proportionately greater, giving a rate of 40.4 per thousand: or in other words 4 per cent. of the population or over 600,000 people in the eight States suffered an attack of malaria. Details of the figures received are given under the names of the various States.

C. M. W.

LINNELL (R. M. C.). **Some Observations on Malaria on Rubber Estates.**—*Trans. Soc. Trop. Med. & Hyg.* 1915 July. Vol. 8. No. 8. pp. 239-261. With 5 charts.

The late author opens his paper by stating that the advice generally given to Europeans starting for the tropics is to take so much quinine a day and not to drink too much whisky. The traveller is led to believe that by these means he will escape malaria, or, should he be unlucky enough to contract it, the attack will be no worse than a slight attack of influenza at home. The author continues that he gave quinine, grains 5 (and more), as a prophylaxis against malaria to over 2,000 Tamil coolies for two-and-a-half years with most disappointing results; in fact, as soon as the coolies became accustomed to the quinine, it seemed to lose any beneficial effect it had had and acted almost as a slow poison. The Tamil coolie is a poor feeder—living chiefly on rice—and he has little or no stamina and will not use a mosquito-curtain, so if the district in which he lives is malarial he is practically certain to become infected. The other imported labour is Chinese. The Chinaman is a much better feeder, more robust, and uses his mosquito-curtain, and will exist where a Tamil dies.

The quinine used was the sulphate, chloride and bihydrochloride, administered in glycerine capsules and in solution. One sort of quinine did not give better results than another, though the coolie did not object so much to the capsule as to the solution. The capsule was washed down with a drink of ac. hyd. dil. or ac. sulph. dil. and was given at a muster held after the morning or afternoon meal under European supervision. If the quinine is given on an empty stomach the coolie generally vomits and cannot eat his rice; also vomiting often happens after a meal with quinine given in solution, so that the capsule is generally used. The afternoon muster is more convenient, for then the coolie has had his chief meal and his work is finished, so that he is more happy than in the cold early morning.

On an estate in typically broken country there was a double seasonal wave of malaria, the first synchronising with the first increase in the rainfall, being highest in April to June, the second just preceding the second increase in rainfall, being highest in September and October. This does not appear to correspond with any increase in fever-carrying mosquitoes, which were, if anything, more easily caught in the healthy period. On a healthy estate examined for comparison there was no increase in malaria with the rains, while fever-carrying mosquitoes could be caught in any quantity all the year round.

Twenty-four Tamil coolies newly arrived from India were placed to reside in an area surrounded by ravines. In these ravines the larvae of *Nyssorhynchus maculatus* were found in quantities. The coolies' bloods were examined and no sign of malaria was detected. They were given quinine grains 5 per day, followed by a drink of ac. hyd. dil. On the fourteenth day after arrival five had fever due to malignant malarial parasites. No parasites were found in the blood of the others. In another very unhealthy area a similar experiment was tried with larger doses of quinine, as follows :

Amount of Quinine daily.	Period.	Average labour force.	Percentage sick daily.
Quin. sulph. grs. x. ..	6 months	24	15·7
„ grs. xv. ..	5 „	30	19·7
„ grs. xx. ..	5 „	25	19·5

The sickness was practically always due to malaria, and after the sixteen months 25 per cent. harboured malarial parasites. These coolies, the author thinks, probably developed a quinine-fast parasite, for when they came into hospital on a healthy site recurrences were extremely common on quinine grains xlv. per day.

In another experiment two batches A and B of 90 coolies each were employed. They were coolies who had been having quinine grains v. daily for over 2 years. Batch A was given no quinine, but instead decoction of coriander by way of giving them something, and also because of a native belief in its efficacy. Batch B was given as before quinine grains 5 daily. The observation was continued for 8 weeks, and the first effect was that the cases of sickness and of malaria dropped markedly during the first week amongst the coolies of batch A. At the end of the period those who had had the quinine regularly had fared worse than those who had had none.

	A. (90 Coolies). Coriander Decoction.		B. (90 Coolies). Quinine grs. v. daily.	
	Sick (all causes).	Clinical Malaria.	Sick (all causes).	Clinical Malaria.
1st week ..	25	9	57	27
2nd „ ..	34	22	57	26
3rd „ ..	41	22	44	14
4th „ ..	39	21	47	17
5th „ ..	28	16	29	15
6th „ ..	33	17	39	30
7th „ ..	32	14	42	20
8th „ ..	22	10	27	15
	254	131	342	164

The batches were then changed over for 8 weeks, the quinine being given to A while B had the coriander. At the end of the period it was again found that the quinine batch had suffered more severely.

	B. (90 Coolies). Coriander Decoction.		A. (90 Coolies). Quinine grs. v. daily.	
	Sick (all causes).	Clinical Malaria.	Sick (all causes).	Clinical Malaria.
1st week ..	35	23	39	12
2nd „ ..	24	10	33	16
3rd „ ..	21	10	31	15
4th „ ..	26	14	25	12
5th „ ..	27	10	26	11
6th „ ..	21	10	21	15
7th „ ..	27	14	27	11
8th „ ..	19	8	29	17
	200	96	241	109

Some observations seemed to indicate that decoction of coriander had some effect on the malarial parasite, and it is stated that beneficial results followed the use of quinine grains v. daily for a week followed by decoction of coriander for a week. A table of cases shows that the quinine grains 5 and coriander on alternate weeks gave better results than continuous quinine grains 5 daily.

Several cases of Europeans are quoted who commenced by taking daily doses of quinine and finally gave it up. The author writes that in his experience a European arriving in the tropics usually takes his daily dose of quinine until he has had malaria twice. He then takes it in larger doses when he thinks he wants it and seems to be much better.

The quinine grains 5 daily and coriander on alternate weeks gave better results than quinine grains 5 on every 6th and 7th day.

The author makes some remarks on the treatment of the cases which came into hospital. On admission the patient has a dose of mist. alba and is put on milk and sol. quin. grs. xv. t.d.s. Next day he has ankylostome treatment—oleum chenopodium minimis vii. at 6 a.m., 7 a.m. and 8 a.m. in glycerine capsule, being allowed no solid food. At 11 a.m. he has an aperient. There seems to be no danger in this treatment and it clears out all kinds of worms. If on admission the malaria is very intense and the patient comatose or collapsed, in addition to strychnine, brandy, etc., the quinine is given by the mouth (if necessary through a nasal tube), as in the author's experience injections of quinine are practically useless.

Recurrences are exceedingly common about the tenth day. To combat this neosalvarsan was tried (intravenously 4 grains in 10 cc. distilled water). Great benefit followed its administration between the sixth and eighth days after the appearance of parasites or fever. In all cases the quinine treatment was continued also.

It is mentioned that the Chinese have an idea that pineapple is very good for getting rid of oedema, generally of beriberi origin. Its use in enlarged malarial spleen was followed by marked reduction in the size of the organ. The pineapples which gave the best results were the Mauritius variety not quite ripe. One or two a day were eaten by each patient.

There are many interesting points in the author's paper which have not been mentioned here, as, for instance, a series of tables illustrating the interval elapsing before treated cases had relapsed after their return to work when they had continuous prophylactic quinine, or quinine on alternate weeks only. Those who wish further details must consult the original article, which is followed by a series of useful criticisms by Sir Ronald Ross, Dr. Andrew BALFOUR and others who attended the meeting of the Society at which Dr. Linnell's paper was read. The following seven conclusions were drawn by the author:—

"1. Quinine grs. v. daily will not stop an attack of malaria, if the patient lives in an unhealthy area.

"2. No amount of quinine on which the coolie can do his work will stop the seasonal wave in ravine country. The area must be sub-soil drained to do this.

"3. Interrupted administrations of quinine will do much to prevent the malaria taking a serious form.

"4. In severe cases of malaria (cerebral cases) the best treatment is to wash out the stomach and give quinine, in plenty, by the mouth.

"5. The best treatment for recurring cases of malaria is intravenous injections of neo-salvarsan, on the sixth to eighth days following the appearance of parasites or fever, followed by quinine.

"6. Pineapples have an effect in reducing malarial spleens and also raise the haemoglobin index. Quinine and pineapples should be given together.

"7. Oleum chenopodium is the most efficient vermifuge for removing ankylostome worms. When ankylostomiasis is uncomplicated with malaria, it does not seem to be very debilitating in Selangor."

C. M. W.

**MINERBI (Giacomo).** *Campagna antimalarica 1913. (Relazione medica pel dominio Khediviale di Dalaman).* [The Antimalarial Campaign of 1913 in the Khedivial Domain of Dalaman.]—*Ann. d'Igiene Sperimentale*. 1915. Vol. 25. (N. ser.) No. 3. pp. 205–233. With 2 maps.

A report of medical work for the year 1913 in a small territory under Egyptian control on the coast of Asia Minor, opposite the island of Rhodes. The population of the district is roughly estimated at 3,000 persons, mostly engaged in agriculture. The country from its configuration is marshy, and malaria is prevalent. In the 12 months 135 persons were treated for malarial symptoms with two deaths, while the numbers under prophylactic treatment with quinine ranged from a monthly maximum of 1,266 in June to 432 in December. As the year 1913 was the first in which any kind of prophylactic treatment had been attempted, naturally no comparative table of results can be presented. The author, however, seems to have made a very good beginning in dealing with the malarial scourge in a new locality. The quantity of quinine employed amounted to 165·5 kilogrammes in all.

J. B. Nias.

**BASS (C. C.).** *Specific Treatment of the Malignant Forms of Malaria.*—*Jl. Amer. Med. Assoc.* 1915. Aug. 14. Vol. 65. No. 7. pp. 577–578.

By the term "malignant forms of malaria" the author means those that prove fatal, those that would prove fatal without treatment,

and those that are sufficiently severe to immediately endanger the patient's life. Nearly all such cases are due to the malignant malarial parasite *P. falciparum*. This parasite spends about three-fourths of its life lodged in the capillaries and only one-fourth in the circulating blood. This fact in itself enables it to produce the malignant type of malarial fever, for the large number of parasites lodged in the capillaries may be the chief source of malignant symptoms. Coma in malaria is due to anaemia of the brain.

Quinine in the blood does not reach the parasites lodged in the capillaries, but if in sufficient concentration it kills those in the circulating blood. The plasmodia in the capillaries come into the circulating blood after they segment and are then exposed to the action of the quinine. Since in the infection with *P. falciparum* there is continuous segmentation—each parasite segmenting independently of the rest—there is a continuous appearance of young forms in the blood, so that to combat these there must be present constantly in the circulating blood a sufficient concentration of quinine. When quinine is introduced directly into the blood it appears in the urine in a few minutes, and many individuals eliminate more than 50 per cent. in the first 12 hours and practically all within 24 hours. Thus it is seen that in order to have a sufficient concentration of quinine in the blood constantly it is necessary to administer it every few hours during this period.

There are three methods of quinine administration—by mouth, hypodermically or intramuscularly, and intravenously. Administration by mouth is often impossible, and if it can be administered it is frequently vomited. Often it is not absorbed and many a patient dies with enough quinine in his stomach to have saved his life if it had been given properly.

Administration into the tissues by means of a hypodermic syringe is in the case of some drugs a rapid method for getting them into the blood, but it is not so with quinine, which causes severe local damage and frequently necrosis, even in its least irritating form—the bimuriate with urea. Absorption is accordingly very irregular, so that again many a patient has died of malaria with more than sufficient quinine in his tissues to have saved his life if it had been properly administered.

The proper method of administration in these cases is intravenously. It is never necessary to give more than 30 grains in 24 hours and never more than 10 grains at one time. Large doses given intravenously are very dangerous. Twenty grains often produces considerable shock, dizziness and nausea, while 50 grains has killed in several cases. The author says he has known several instances in which a 100 grains or more of quinine has been administered during the last 24 or 36 hours before death. In such cases the necropsy fails to reveal sufficient plasmodia to account for death. In other words death has resulted from quinine poisoning. Danger can be avoided by giving 10 grains of quinine hydrochloride intravenously every eight hours or 5 grains every four hours, and this will kill the plasmodia in the blood stream and prevent their reproduction as certainly as any larger quantity. It is mentioned that theoretically amyl nitrite inhalations should dislodge plasmodia from the capillaries and may be of use after quinine has been introduced into the blood.



In many cases of malignant malaria the actual volume of malarial parasites is very great, and, assuming one cell in five to be infected, the volume of parasites in the body may reach one pint.

As regards malarial haemoglobinuria there is no indication for quinine, for the infected cells are the ones most easily haemolysed and their parasites escape into the plasma, which destroys them. There is even a contra-indication, for quinine tends to increase haemoglobinuria.

C. M. W.

**SHIRCORE (J. O.). Intravenous Injection of Quinine.**—*Trans. Soc. Trop. Med. & Hyg.* 1915. July. Vol. 8. No. 8. p. 282.

The author writes that he has seen no harm result from the intravenous injection of the contents of the ordinary ampoules (B. & W.), containing 10·34 grains of quinine hydrochloride in 1 cc. without any dilution whatever. The injections were performed slowly. In one of the four cases thus treated another injection was given within three hours of the first. The effect on the course of the disease was marked, the patients making uneventful recoveries on quinine continued by the mouth.

C. M. W.

**MEDICAL MISSIONS IN INDIA.** 1915. July. Vol. 21. No. 82. pp. 78-96.  
—**Symposium : The Treatment of Malarial Fever.**

The opinions of seventeen medical men on the treatment of malarial fever in India are set forth in this paper. Practically all of the writers who have tried the method speak highly of intramuscular injections of quinine in certain cases in which quinine by the mouth cannot be administered. Some advise the employment of this method for purely prophylactic reasons. MUIR, writing from Kalna, believes that the value of these injections is due to the irritation causing a general leucocytosis, and he advises the intramuscular injection of a mixture (Turpentine 1, Camphor 1, Creosote 1, Olive oil 2½) in doses of about 5 minims for an adult in place of the quinine injection, which is often painful. This is a form of treatment which the author recommended a few years ago for the treatment of kala azar, for which larger doses and more prolonged treatment have to be adopted. Some of the writers find that quinoidine (the residual alkaloids of Cinchona) is quite useful for ordinary cases of malaria and has the advantage of being cheaper than quinine. All are agreed that quinine by the mouth is the usual method of treatment; most are in favour of continual dosage with quinine as a prophylactic measure.

C. M. W.

**LIEFMANN (Emil). Ein Beitrag zur Chemotherapie der chronischen Malaria.**—*Therapeut. Monatshefte.* 1915. May. Vol. 29. No. 5. pp. 260-261.

A case of malarial anaemia with marked enlargement of the spleen and persisting gametocytes in the blood was treated with ethylhydrocuprein (Optochin hydrochloride) in doses of 0·5 gram three times a day during a period of three weeks. There resulted an immediate improvement in the general condition and disappearance of the spleen tumour, so that the case could be considered as cured. The use of

this drug would appear to be indicated in cases where quinine could not be employed, but from the scanty data it is difficult to judge if one can speak of a *Therapia sterilisans magna*. C. M. W.

**BARLOW (Nathan). Intravenous Mercuric Chlorid in Malaria. Preliminary Report.**—*Amer. Jl. Trop. Dis. & Prevent. Med.* 1915. June. Vol. 2. No. 12. pp. 764-766.

The author, writing from Cuyamel, Honduras, commences his paper by pointing out that "throughout the entire south, both the rank and file of the profession and the laity are firmly convinced of the value of calomel in malaria, and in almost every locality some old practitioner will relate cases of chills and fever cured by calomel alone." To test the validity of this claim calomel was tried on a case of malaria in a white man, who was unable to take quinine owing to a marked idiosyncrasy against the drug. Salvarsan 0.6 gram had been tried and, though improvement had resulted, the infection was not destroyed, and the patient commenced to have regular paroxysms again. He was then put on calomel, 2 grains every other night for two months. Rapid improvement ensued and after one month parasites were no longer to be found in the blood. He was under observation for a period of six months and remained free from symptoms and plasmodia.

Encouraged by this result, and taking into account the slow and uncertain absorption of mercury when given by ordinary methods, intravenous injection of perchloride of mercury was tried on a patient whose blood showed very heavy tertian infection. An intravenous injection of slightly less than one-fourth of a grain of mercuric chloride was given at 10 a.m. on the day on which the chill was due at 4 p.m. The paroxysm did not appear, but was replaced by a gentle fever beginning without chill at 2 p.m., the temperature rising to 101.6° at 5 p.m. There were no further symptoms of malaria. The patient had suffered from malarial paroxysms occurring every other day during the nine days before treatment, and he had taken a single 5-grain capsule of quinine, which had had no effect on the blood picture.

The author is of opinion that the action of the mercuric chloride is a direct one upon the parasite, while the quinine acts indirectly by decreasing the stability of the red blood cell. C. M. W.

**STOTT (H.). Studies in Malaria.**—*Indian Med. Gaz.* 1915. July. Vol. 50. No. 7. pp. 250-255. With 5 charts.

This paper is a continuation of a series of Studies in Malaria which have been reviewed [this *Bulletin*, Vol. 6, pp. 77-85]. The author now records his experience in the use of salvarsan in five cases of malaria. He comes to the conclusion that the drug has some undoubted specific action on the asexual forms of the parasite, but has no power of preventing the appearance of the sexual forms. The dose given was 0.5 grains [2 grams]. The details of the cases are shown in a table which is reproduced here. The heading of column J.—"Quinine or not"—means the subsequent use of quinine in order to bring about the cure which salvarsan had failed to produce.

C. M. W.

TABLE FROM H. STOTT'S PAPER SHOWING THE EFFECT OF AN INJECTION OF SALVARSAN IN FIVE CASES OF MALARIAL DISEASE.

—	A.	B.	C.	D.	F.	F.	G.	H.	I.	J.
Case.	Diagnosis.	Action on fever.	Spleen.	Asexual forms of parasite.	Large Mononuclear percentage.	Effect on strength of Patient.	Gametes appeared after.	Result.	Disposal.	Quinine or not.
I.	M.T.M.	Stopped at once	Diminished size	Eliminated for 14 days	..	Weakened	2 days	Relapsed	Sick leave	Q.
II.	M.T.M.	Do.	Do.	None found	Diminished	Poisoned	Do.	Apparent cure	Sick leave Medical Bd. Invalided	Nil
III.	Q.M.	Do.	No spleen observed	Eliminated entirely	Do.	Improved	9 days	Apparent cure relapsed	Duty	Q.
IV.	Q.M.	Diminished three attacks	Do.	Diminished for 9 days	No effect	<i>In statu quo</i>	3 days	Practically uninfluenced	Sick leave Death	Q.
V.	B.T.M. M.T.M.	{ No practical effect }	{ Do. }	Eliminated Eliminated for 2 days.	{ Do. }	Do. {	{ Do. }	{ Uninfluenced. }	{ Duty }	Q.

da MATTÁ (Alfredo A.). **Casos de pseudo-tabes palustre no Amazonas. Notas para o seu diagnostico differencial. Pathogenia.** [Cases of Malarial Pseudo-Tabes in the Amazons. Notes on its Differential Diagnosis. Pathology.] *Brazil Med.* 1914. Nov. 1. Vol. 28. No. 41. pp. 381-383; Nov. 8. No. 42. pp. 391-393; Nov. 22. No. 44. pp. 405-407.

The author, who practises at Manaus in Brazil, furnishes some interesting notes on that rather rare complication of malaria, pseudo-tabes, of which he has seen altogether 18 cases. The histories of three patients, all adult males, are given at length. The paralysis appears to attack all the extremities simultaneously like ordinary peripheral neuritis. In the arms flexion and extension of the limb will be performed with difficulty, while the powers of movement in the hand will be almost entirely lost. Similarly, the power of walking will be almost or entirely lost from the paralysis of the feet, while the patient will retain considerable power of flexing the limb on the trunk, or the lower leg at the knee, when lying down. The patellar and plantar reflexes are reduced or abolished. Loss of cutaneous sensibility follows very closely the distribution of muscular paralysis. The patients have generally been severely attacked by malaria, and the symptoms generally supervene in the chronic or apyrexial stage. The blood may show crescents. The spleen and liver will be large and tender, and the presence of urobilin in the urine is an important diagnostic sign. The haemoglobin in the blood may be only 40 or 50 per cent. of the normal. Palpitation on exertion in proportion to the anaemia, with coldness and clamminess of the extremities, will probably be present.

The differential diagnosis from alcoholic neuritis and true tabes dorsalis is not difficult, but there are in the Amazon valley forms of paralysis of the beriberi type with which the disease may be readily confounded. These beriberi forms have been described by LOVEACE [this *Bulletin*, Vol. 1, p. 484], their true nature being still doubtful. If the case is really malarial, active treatment with quinine, galvanization, and so forth, will speedily bring about a complete cure. In one of the cases narrated recovery was complete in 23 days, and in another in 2 months, whilst the third was sent away by sea to a more healthy locality, namely, Belem. The author points out that MANSON has drawn more attention to these forms of malarial paralysis than any other writer.

J. B. N.

de FIGUEIREDO (Antonio Gonçalves). **Um caso de kysto hematico da vesicula biliar de natureza palustre.** [A Case of Haemorrhagic Cyst of the Gall-Bladder of Malarial Origin.]—*Arch. Brasil. Med.* 1915. Jan. Vol. 5. No. 1. pp. 54-60. With 1 text-fig.

The patient was a woman of 38 years of age, who had suffered from malaria. About four years previously to coming under observation, as the result of getting up suddenly in the night and tying her clothes tightly round her, she was conscious of a pain in the region of the liver, which caused her to exclaim that her liver had fallen out of place. The sensation was followed by rigors and the appearance of a tumour in the hepatic region of the size of a lemon.

On coming under observation the liver was found to be dragged downwards, so that its upper surface could be felt in the epigastrium while its lower border descended to the pelvic brim. Continuous with the liver margin was a large cystic tumour, the spleen being likewise enlarged and measuring 23 by 18 centimetres. A laparotomy was performed and the cyst tapped and sutured to the margins of the wound. Two litres of a chocolate-coloured fluid were drawn off which was found microscopically to consist wholly of altered blood without any admixture of bile. The cystic duct was found to be obliterated. A number of malarial crescents were found in the evacuated blood to the number of two or three in each preparation. A portion of the cyst-wall was excised and examined microscopically, and found to consist exclusively of thickened gall-bladder tissue. The patient made a good recovery.

J. B. N.

LEVY (S.). **Eine Malaria-Infektion in Cöln.**—*Deut. Med. Woch.* 1915. July 15. Vol. 41. No. 29. p. 861.

The case recorded is of a child six years of age, who contracted malarial fever in Cologne. The parasites in the blood were of the benign tertian variety. The parents of the child are quite unable to show that the child associated in any way with any person suffering from the disease.

C. M. W.

BRIGNONE (E.). **La Propaganda e Profilassi Antimalarica nelle scuole comunali di Terranova Monferrato durante l'anno 1914.**—*Malaria-ologia. (La Propaganda Antimalarica)*. 1915. June 15. Vol. 8. No. 3. pp. 63-72.

Of the 280 children attending the elementary schools of the district of Terranova Monferrato during the year 1914, 238 were systematically treated prophylactically with quinine, with the gratifying result that not one of them developed symptoms of malaria during a period of treatment extending from March 16th to July 1st.

J. B. N.

LUDLOW (C. S.). **A Question of Synonymy.**—*Milit. Surgeon.* 1915. June. Vol. 36. No. 6. pp. 505-508.

From this note it appears that the mosquito named *A. febrifer* sp. nov., in WALKER and BARBER's paper on Malaria in the Philippine Islands [see this *Bulletin*, Vol. 5, p. 337 and above] is really *A. christophersi* Theobald. It is explained how the error arose. The synonymy is

*Anopheles (Myzomyia) christophersi* Theobald =  
*alboapicalis* Theobald.  
*Mangyana* Banks.  
*funesta* Ludlow non Giles.  
*flavivirostris* Ludlow.  
*febrifer* Banks.

Moreover the *A. rossi* of the same paper should be *A. indefinata*, the true *rossi* not occurring further east than India and Ceylon (EDWARDS). [According to Mr. Guy MARSHALL the proper name for "*A. febrifer*" is *A. minimus* Theo. (*Review of Applied Entomology*, Series B, 1915. May. Vol. 3, p. 65).]

A. G. B.

**CARDAMATIS (Jean P.). Du Paludisme dans la Grèce Continentale depuis les temps les plus reculés jusqu'à l'époque Macédonienne.**—*Arch. f. Schiffs- u. Trop.-Hyg.* 1915. May. Vol. 19. No. 10. pp. 273-286; June. No. 11. pp. 301-312.

This paper is of much interest from the historical point of view, setting forth the results of the author's researches into classical literature with a view to showing that malarial fever has existed in Greece from the most remote period of its history. He shows that many of the plagues and pestilences which attacked the ancient races were really epidemics of paludism, and some of the disasters which befell the great armies of ancient times, as during the period of the battle of Marathon, were due to the ravages of this disease. The paper should be consulted by all interested in the historical aspect of this most interesting subject.

C. M. W.

**O'CONNELL (Mathew D.). The Meteorology of Malaria.**—*Jl. Trop. Med. & Hyg.* 1915. Aug. 2. Vol. 18. No. 15. pp. 169-170.

In a table the author sets forth the atmospheric conditions in Colon, at the Pacific end of the Panama Canal, for a continuous period of 48 hours in the month of August, when malaria is prevalent, with a view to illustrating his theory that under certain conditions there is retention or accumulation of water in the body, thereby increasing destructive metabolism or heat production and impeding heat loss. That there is an increase of water in the blood in malaria, he says, is well recognised by malariologists. Human blood on an average contains 79 per cent. of water—some men having, say, 78, and others 80 per cent. If water is retained owing to atmospheric conditions at the rate of 1 per cent., then at the end of such a period the two men will have 79 and 81 per cent. respectively. According to the author the production of heat in the latter man will be greater than in the former—the one will have fever and the other will be immune.

[It is difficult to follow this argument, which appears at any rate to ignore the existence of the malarial parasite.]

C. M. W.

**La-PUENTE (Ignacio). Paludismo en la costa del Perú. Etiología—Formas Clínicas—Profilaxis.** [Malaria on the Coast of Peru.]—*Memoria presentada al V Congreso Médico Latino-Americano.* Lima. 1914. 69 pp.

A report presented to the 5th Latino-American Medical Congress on the subject indicated by the title.

The littoral of Peru extends from 4° 40' to 19° 12' of South latitude; that is to say, it is about 2,500 kilometres in length. It is traversed by as many as 45 different rivers, which take their rise on the western slopes of the Andes and fall into the Pacific Ocean. In the lower parts of their respective courses the majority of these rivers give rise to swamps of greater or less extent, which, as a matter of course, breed malaria, if the temperature of the locality is high enough, as it always is near the sea-level. The prevalence of malaria in Peru varies with

the time of year, and does not coincide with the period of the greatest prevalence of mosquitoes, a fact which appears to lead Peruvian practitioners, if the author of this memoir is to be trusted, to ascribe the propagation of malaria to other agents besides mosquitoes, such as air and drinking water. In fact, if one may be permitted to say so, the views emitted by the author on the subject of the propagation of malaria appear to be a trifle old-fashioned, being mainly based on the earlier writings of LAVERAN and Le DANTEC, both of whom are frequently cited. In the city of Lima and its suburbs the largest number of cases of malaria occur in the first six months of the year, between January and June, the months of January, February and March being those of greatest rainfall and maximum heat; mosquitoes are, however, most prevalent in the last six months of the year, which are the coolest and driest. In Lima, *Plasmodium falciparum* is the parasite most frequently found in the blood of patients, *P. vivax* coming next and *P. malariae* last. The dominant Anopheles in the environs of Lima is *A. superpictus* or a variety of the same.

J. B. N.

## MISCELLANEOUS.

**EAST AFRICA PROTECTORATE. Nairobi Laboratory Report (Bacteriological Section) for the Months Jan.-June 1914.** Vol. 5. Pt 1. [J. H. HARVEY PIRIE, Acting Government Bacteriologist.]—20 pp. 1914. Nairobi: Printed by the Govt. Printer.

In the six months under review there was again an increase in the number of examinations made in the laboratory, largely due to the number of rats (3274) examined for plague. The author had the misfortune to lose nearly all his laboratory animals, owing to the depredations of a mongoose and disease. A table shows the monthly incidence of malaria with the monthly rainfall. With respect to enteric fever "the number of cases for examination and the number giving a positive Widal reaction showed a very considerable increase . . . not confined to any one district, but fairly widely spread." Sixteen rats were plague infected out of 3,274; all were captured or found in Nairobi, on various dates and scattered through the town.

A possible source of error in the diagnosis of schistosomiasis was "a large number of rounded spiny tetrahedral bodies and a smaller number of bodies not unlike *Schistosoma* ova in size and general appearance, including a 'spur' in a lateral position" found in a sample of urine. The Government Mycologist identified the first as the uredospores and the second as the teleutospores of *Hemileia vastatrix*, the organism of coffee blight.

Organisms "more or less closely corresponding with dysentery bacilli" were isolated from five cases. Their investigation is in progress. The new Nakuru water supply was reported on as not suitable for drinking purposes in its raw state, but only after storage, liming and filtration. The Nairobi water was found to contain "a sufficient number of organisms indicative of faecal contamination to raise suspicion that it may well be the cause of the dysenteric conditions so common in Nairobi the past few months."

A. G. B.

**SERGEANT (Edmond). Rapport sur le Fonctionnement de l'Institut Pasteur d'Algérie en 1914.**—25 pp. With 1 chart. 1915. Alger: Imprimerie administrative E. Pfister, 9, Rue Trolhier.

In spite of the diminution of personnel in consequence of the war the work of the Pasteur Institute of Algeria has continued to develop. At the time of mobilisation the Institute was put at the disposal of the military authorities. Between August and December there were prepared and distributed to the army nearly 70,000 doses of anti-smallpox vaccine and 391,000 cc. of antityphoid vaccine, enough for the vaccination of 75,000 men. The laboratory at Beni-Ounif-de-Figuig in the Sahara, in accordance with the programme drawn up in 1908, has begun to give off offshoots and a laboratory has been created at Beni Abbès, in the extreme south of Oran. At the Pasteur Institute 3,500 analyses were made in the year. Of these the following are of interest:—Microscopical examinations for the diagnosis of tuberculosis 342, of malaria 110, diphtheria 68, relapsing fever 65, cerebro-spinal meningitis 49. Sero-diagnostic examinations have been made for typhoid fever 554, paratyphoid A 434, paratyphoid B 425, undulant fever 137; blood cultures for the same diseases 137.



The total number of persons treated for rabies was 1,191. Of people bitten by animals in whom rabies was experimentally recognised at the laboratory there were 72 and no deaths; of people bitten by animals in whom rabies was recognised by veterinary examination there were 416 with one death; 727 people had been bitten by animals suspected of rabies, with four deaths. Other details are given.

Malarial prophylaxis has gone on as in preceding years. In one of the three places chosen out of the most feverous for demonstration, Montebello, there has been an interesting experience showing the efficacy of the prophylactic measures taken and the need for their continuation. These measures, which have been regularly practised for the last ten years, had caused the disappearance of malaria amongst the Europeans; there had not been during that time a single case of infection amongst infants or new comers. When the war broke out the anti-larval measures were interrupted for a month; mosquitoes reappeared in the village, and malaria. As soon as antimalarial measures were reinstituted all was well. Similar observations have been made in other localities.

In 1914 the Pasteur Institute has given out over two and a half million units of serums, vaccines, or medical and veterinary biological products. Details are given. An account is given of the researches prosecuted during the year with a list of publications; these have been adequately treated in the *Bulletin*.

A. G. B.

**VIALATTE (Ch.). Rapport sur le fonctionnement du laboratoire de microscopie de Beni-Abbès en 1914.** - *Bull. Soc. Path. Exot.* 1915. Feb. Vol. 8. No. 2. pp. 66-70. With 1 chart.

The laboratory at Beni-Abbès, in the Sahara at 30° N., has been in full working since May, 1914. It is an offshoot of the Pasteur Institute at Algiers and is attached to the garrison hospital.

In 51 patients whose blood was examined malarial parasites were found seven times (benign tertian 5, malignant tertian 2), and the spirochaetes of relapsing fever eight times. Of 113 children, from fifteen downwards, 22 had splenic enlargement, in 25 crescents were seen, in 7 benign tertian parasites, and in one quartan.

Purulent conjunctivitis is common, due to the bacillus of Weeks, the gonococcus, and the diplobacillus of Morax—in that order. Trachoma however is the most wide spread of eye diseases.

An epizootic of debab raged in the neighbourhood in 1914. Trypanosomes were found in 13 out of 73 camels, and two out of 31 horses. Clinical observation suggested that direct contagion "by the mucosae" might have occurred.

A. G. B.

**AUSTRALIAN INSTITUTE OF TROPICAL MEDICINE, Townsville, Queensland. Half-Yearly Report from 1st January to 30th June 1914.** [Director A. BREINL].—13 pp. fcap. Printed and published by Albert J. Mullett, Govt. Printer.

During the period under review BREINL and PRIESTLEY continued the enquiry into the health and general condition of school children in Townsville begun in 1913. It was sought to ascertain whether the

blood of children of European descent born in Queensland was normal as far as the formed elements were concerned. The result of 580 complete blood counts and haemoglobin estimations was to give figures corresponding to what is considered normal for Europeans living in a temperate climate [see this *Bulletin*, Vol. 5, p. 371]. An Arneth count was made on 150 school children at the same time. The result showed a decided "shift to the left" resembling the figures obtained for patients suffering from infectious disease. This alteration appears to be due to climatic influences only (*loc. cit.* p. 372). BREINL has discovered the parasite of *Gangosa* in New Guinea, a *Cryptococcus* which he has named *C. mutilans* [see this *Bulletin*, Vol. 6, p. 141].

BREINL and YOUNG studied a number of cases of lead poisoning in children (*loc. cit.*, Vol. 5, p. 437).

During the six months 112 cases were treated by BREINL and PRIESTLEY in the tropical wards of the Townsville General Hospital. These included ankylostomiasis (20 cases), typhoid (35), "indefinite fever" (15), filariasis (8), sprue (7), malaria (3).

The Report of the Biochemical Laboratory is by Dr. YOUNG. Observations on the intensity of the violet and ultra-violet rays in the sunlight went to show that a high intensity in these rays is not a feature peculiar to tropical sunlight [this *Bulletin*, Vol. 4, p. 529].

A study was made of the nitrogenous metabolism in a case of chyluria. The quantity of chyle in the urine, as measured by the proteins excreted, was the same whether the diet was rich in fat or fat free, so that the practice of reducing fats to a minimum does not seem to be justified. The quantity of protein in the urine appears to be the best guide to the condition of chyluria patients since these are the substances which form the clots and cause difficulty in passing urine [this *Bulletin*, Vol. 5, p. 15].

A study of the general metabolism of white people in the tropics is being carried out. As a beginning data have been collected with respect to the body temperature. The temperatures of six males have been taken at fixed times of the day over periods of at least two weeks, in both mouth and rectum. Considerable individual differences were noted, unconnected with length of residence in the tropics. The temperatures observed resemble those found by PEMBREY in workers in cotton mills and factories where a high humidity prevails. Rectal temperatures above 100° F. were frequently observed.

Experiments were made on the protein metabolism of the body. In the four cases observed there were no striking deviations from the results obtained in temperate countries.

Black pigment was extracted from the skin of an Australian native and a small quantity obtained pure. A solution in alkali was examined spectroscopically. It was found to absorb all the rays in the violet end of the spectrum, the yellow and red being quite unaffected.

Dr. NICOLL reports from the Parasitological Department. An investigation was undertaken on the effect of salt and other substances in arresting and preventing the development of the eggs and embryos of the human hook-worm. Common salt in solutions of varying strength was employed. Even with a 6 per cent. solution it was found that several eggs were capable of hatching out for as long as six days.

"From this it is evident that a continued application of a strong solution of salt for at least a week is necessary to make certain of destroying all the eggs in the infective material."

Work was continued on worm-nodules in cattle.

One hundred and thirty five mosquitoes of seven species were examined for bacteria. These were found nine times, in *S. fasciata* five, in *Culicella vigilax* four times. None of these could be identified with disease-producing organisms.

Dr. PRIESTLEY reports on bacteriological work. All patients admitted to hospital with symptoms clinically resembling typhoid were carefully examined bacteriologically; in only one case was the typhoid bacillus isolated from the blood. The Widal reactions were typical in only a few cases. He believes that there are "several varieties of fever in North Queensland which while resembling typhoid fever in some respects differ markedly in other respects." Some attention was given to water examination.

Dr. Taylor reports from the Entomological Department, chiefly on the results of a survey of the blood-sucking insects of Australia.

A. G. B.

HARVEY (W. F.) & ACTON (H. W.). **Blood Characters: Their Variability and Interdependence.**—*Indian Jl. Med. Research.* 1915. Jan. Vol. 2. No. 3. pp. 721-732. With 2 charts.

The authors write that many different characters have been taken as indications of the state of the blood, such as number of red corpuscles, quantity of haemoglobin etc., but comparatively little work has been done to determine how far they are related to one another in the sense that they vary together. The observations were made on adults who came to the Pasteur Institute of India for anti-rabic treatment. Care was taken to exclude any obvious pathological state. Other observations were made at Kasauli in the sub-Himalayan region. They determined (1) the variability of certain blood characters in normal individuals; (2) the correlations of these characters; (3) the degree of alteration of these with 14 days residence at 6,000 ft. above sea level. A large section of the paper is occupied by the technique and tables.

The findings were as follows:—

"1. There is little variation in the resistance of red blood corpuscles to the action of hypotonic solutions either amongst individuals themselves or as between individuals on their first arrival at a high altitude and after residence there for a period of fourteen days. The same applies to the chloride content of the blood serum. . . .

"2. Number and volume of red blood corpuscles, specific gravity, and haemoglobin content of the blood vary to a very considerable extent in conditions of apparent health. The extent of the variation must be, we are inclined to think, greater in the Indian than in the European. This may very likely be due to the fact that the Indian suffers largely in the ordinary course of his daily life from disease conditions which markedly affect blood characters. . . . We have described this population as 'apparently healthy.' This means that besides taking count of external appearance we have excluded such cases as developed a definite attack of malaria during the period of observation. No other selection than this was made however.

"3. The correlation between such characters as number and volume of red blood corpuscles, haemoglobin content, and specific gravity, etc., is close.

"4. There is an increase in total volume of red blood corpuscles, haemoglobin content, and specific gravity with residence at a high altitude, as we should expect from the correlation of each of these characters with number of red blood corpuscles."

A. G. B.

KNAPP (H. H. G.). **The Significance of Arneth's Leucocyte Count.**  
—*Indian Med. Gaz.* 1915. Mar. Vol. 50. No. 3. pp. 95-97.

The author, who writes from Rangoon, concludes: that Arneth's method is of distinct value in pathology: that there is a shift to the left, of greater or less extent, in several infectious diseases. It is well seen in measles, and is pretty constant in malaria [present in 17 cases, absent in 14]; that there is evidence of a right-shift in some infections, notably in leprosy [right shift in 12, left shift in 3]; that in tuberculosis the shift [to the left] is more pronounced the more advanced the disease: that absence of shift is presumptive evidence against a diagnosis of tubercle or malaria.

A. G. B.

MACFIE (J. W. Scott). **The Significance of Nuclear Variations of Neutrophile Leucocytes (Arneth Counts) in West Africa.**—*Lancet.* 1915. May 1. p. 911.

The author, writing from the Accra Laboratory, states that in a number of cases of malarial fever in which there was a heavy infection with *P. falciparum* the Arneth count showed a well-marked shift to the left, persisting after the disappearance of the parasites and recovery. One case only is referred to in detail: a fatal case, in which 47·6 per cent. of the red cells were invaded and no less than 95·5 per cent. of the neutrophiles belonged to Classes 1 and 2 (Class 1, 78; Class 2, 17·5). The neutrophiles had ingested a large number of parasites and it was possible to gauge the phagocytic power of the cells of the different classes. It was noted that the leucocytes in which the ingested parasites were most numerous were almost always those of Class 1, some of which contained 30 or 40, indicating that their phagocytic activity is not reduced and that ARNETH'S view that they are immature is incorrect, and supporting the view of BREINL and PRIESTLEY [this *Bulletin*, Vol. 5, p. 372]. The author concludes by pointing out that in estimating the value of Arneth counts in West Africa the bearing of malarial infections, both recent and remote, must be carefully considered. [The case referred to would appear to be that described in a previous paper (see this *Bulletin*, Vol. 5, p. 243).]

A. G. B.

DOTY (Alvah H.). **The Extermination of the Mosquito.**—*Jl. Amer. Med. Assoc.* 1915. May 29. Vol. 64. No. 22. pp. 1836-1838.

The gist of this communication is that "the extermination of the mosquito can be accomplished only by the destruction of its breeding  
(C203)

place." He refers to the aid that may be given by waterfowl, fishes and bats only to emphasize his belief that no reliance can be placed on these creatures. His own work has been done on Staten Island, New York, where about 10 square miles of salt water swamp land was drained and freed from the breeding places of the "striped legged" mosquito. The breeding ground of this species is sharply marked off from those of the inland mosquitoes. To secure that the necessary measures be carried out uniformly the work must be under some form of official control. A note is added on the use of petroleum oil. This agent is only for temporary purposes. Semi-refined oil should be used; the refined is too thin and the crude does not spread over the whole surface. There is no efficient substitute for petroleum. While it is a valuable temporary agent in dealing with the inland mosquitoes, it is worthless for the destruction of the coast mosquito.

A. G. B.

**SALM (A. J.). Over het vernietigen van muskieten en muskieten-larven, [The Destruction of Mosquitoes and their Larvæ].**—*Geneesk Tijdschr. v. Ned.-Ind.* 1915. Vol. 55. No. 2. pp. 173-179. With 1 text-fig.

In many parts of the tropics it is the custom to keep bath-tubs, and other vessels made of wood, filled with water in order to prevent them from shrinking. Under these circumstances they tend to become breeding places for mosquitoes. The author initiated experiments to see what substances could be added to the water to prevent this development of mosquitoes, and found that the addition of from 1-5000 to 1-10,000 of copper sulphate with sufficient sulphuric acid to prevent deposition, will keep the larvae from reaching the winged stage, though it does not prevent them from hatching out from the egg. Lysol in the strength of 1:3200 is equally efficacious, but has the disadvantage of communicating a taste to any drinking water that may be subsequently kept in the receptacles, for which reason the copper sulphate solution is generally preferable.

J. B. N.

**BISHOPP (F. C.). A Point to be considered in utilizing the Duck as a Mosquito Destroyer.**—*Amer. Jl. Trop. Dis. & Prevent. Med.* 1915. June. Vol. 2. No. 12. pp. 767-768.

The author refers to the paper by DIXON [reviewed in this *Bulletin*, Vol. 5, p. 309] and admits the value of ducks as mosquito destroyers. His object is to draw attention to the habits which ducks have of digging holes in moist ground. He has observed excavations four to six inches deep and in two instances has found mosquitoes breeding therein. The holes may become inconspicuous by the growth of grass. "The question of smoothing up yards where ducks have been kept should not be lost sight of."

A. G. B.

GALLI-VALLERIO (Bruno) & ROCHAZ de JONGH (Jeanne). *Studi e Ricerche sui Culicidi*. 10<sup>a</sup> Memoria. [Studies and Researches on the Culicidae].—*Malariologia*. (*Propaganda Antimalarica*). 1915. Apr. 15. Vol. 8. No. 1-2. pp. 9-11.

Some interesting observations on the hibernation of mosquitoes in the neighbourhood of Orbe, Canton of Vaud, Switzerland. Larvae of *Anopheles nigripes* were found on the 17th September at an altitude of 900 metres above sea level (nearly 3,000 feet) in a cavity in a fir-tree. Larvae and nymphs of *C. pipiens*, *C. nemorosus* and *Theobaldia annulata* were numerous in ditches between October 20th and November 3rd 1912. Larvae of *Anopheles bifurcatus* were found about the same date. Throughout the winter larvae of both *Culex* and *Anopheles* continued abundant. On the 1st of January 1914, larvae of *C. nemorosus* were found in pools in woods, covered with ice of a thickness of one centimetre, and on the 9th of February larvae of *Corethra velutinus*. Nymphs of *C. nemorosus* appeared in the ditches on the 26th of April, the temperature of the air being 13° C. and that of the water 17°, but nymphs of *A. bifurcatus* did not appear till May.

J. B. N.

ROSS (Ronald). Louis Daniel Beaupérthuy and Mosquito-borne Diseases. [Correspondence].—*Lancet*. 1915. Mar. 6. pp. 513-514;

BALFOUR (Andrew).—*Ibid.* Mar. 27. p. 675.

ROSS (Ronald).—*Ibid.* Apr. 3. pp. 725-726.

Ross takes exception to a remark made by the reviewer suggesting that BEAUPERTHUY's name is at least as worthy of mention in the ranks of the early mosquito theorists as that of KING. He is supported by SEIDELIN, who quotes passages from BEAUPERTHUY's works to show that the latter has been over-rated by BOYCE and AGRAMONTE. Balfour replies giving reasons for his belief that BEAUPERTHUY's work has at least equal merit with that of KING, and criticising some of the arguments advanced by SEIDELIN. Ross comments upon this letter, and there for the present the matter ends, but a paper by BLANCHARD, the publication of which has been delayed by the war, is likely to throw fresh light on the subject which, though not very important, has a certain historical interest.

A. B.

RINGENBACH (J.) & GUYOMARC'H. *Notes de Géographie médicale de la Section française de la Mission de délimitation Afrique équatoriale française-Cameroun en 1912-1913*. Variole.—Paludisme.—Maladies vénériennes.—Maladies du tube digestif.—Maladies cutanées.—Appareils locomoteur, circulatoire, nerveux, génito-urinaire.—Affections des organes des sens.—Intoxications.—Envenimations.—Affections chirurgicales.—*Bull. Soc. Path. Exot.* 1915. Apr. Vol. 8. No. 4. pp. 199-208; May. No. 5. pp. 301-313.

In this paper the authors deal at some length with the diseases met with in the country traversed by the Commission engaged in delimiting the boundary between the Cameroon and French Equatorial Africa in 1912-13. Native methods of treatment and native beliefs regarding disease are noted and, as far as it could be ascertained, the medical history of the parts visited.

*Smallpox*.—Between the sea and the Sangha River not a single pocked native was seen. This is explained by the isolation in which the peoples concerned have hitherto lived. Beyond the Sangha the disease was found endemic. The necessity is urged of introducing at once the practice of vaccination.

*Malaria*.—Malaria is very common but rarely severe. Blood smears were obtained from children in the villages traversed and brought to France. Unfortunately most became overgrown with moulds. Of those that could be examined 67 per cent. from children under five contained parasites, and 61 per cent. from children over five. Quartan parasites were most common, malignant tertian less so; parasites of benign tertian were not seen.

*Syphilis*.—External manifestations of this disease were noted in 48 of 1,500 natives between the sea and the Ivindo, 90 out of 2,250 between the Sangha and the Lobaye and 11 out of 200 between the Lobaye and the Ouham; i.e., 3·2, 4·0 and 5·5 per cent. respectively. Visceral and nervous syphilis are very rare in this region. Ocular symptoms were not met with. Hereditary syphilis is very rare; Hutchinson's teeth were never seen. Syphilis is often spread by eating with the fingers from a common receptacle, and by sharing drinking cup and pipe.

*Gonorrhoea* is rare except in the neighbourhood of stations, where it rages. Stricture is the most common complication.

*Stomatitis* is common and is attributed to mutilation of the teeth leading to caries, or to strongly spiced food.

*Helminths*.—*A. lumbricoides* is very common. Eggs of ankylostomes were often seen but no severe case of ankylostomiasis disease. *Tricocephalus trichiuris* is common, *Oxyuris vermicularis* less so. No tape worm eggs were seen. Pigs and cattle seldom form part of the food of the native and the pumpkin seeds which he eats daily would get rid of any tape worms that existed.

*Dysentery*.—Only one case was seen. From the clinical characters and absence of amoebae it was believed to be bacillary.

*Malignant tumours* were not seen.

*Skin diseases*.—Those met with were itch and phthiriasis (very prevalent), chigoes, trichophytosis of the scalp (common). Sores and ulcers were seen everywhere, often complicated with phagedaena. "Cro-cro" is frequent. This begins with a vesicle-pustule that breaks and becomes covered with a crust under which pus collects; when the crust is removed there is seen an ulcer without excessive granulations, the edges perpendicular, the base of the colour of wine lees, with no tendency to cicatrise; enlargement of glands is rare. It is found on the legs especially after walking through marsh. Healing occurs in a fortnight or a month, leaving a brownish permanent cicatrix. Boric acid in flakes renewed every third day gave the best results.

Attacks of "rhumatisme" are common, but no diseases of the vascular system were seen. Hydrocele was common; the authors attributed it to filarial disease. Three cases of deaf-mutism were met with.

Filariasis, leprosy and yaws have been dealt with in other papers.

SILER (J. F.). **Medical Notes on Barbados, British West Indies. Part One: General Information Concerning Barbados; Its Prevailing Diseases.**—*Amer. Jl. Trop. Dis. & Prevent. Med.* 1915. July. Vol. 3. No. 1. pp. 46–63. With 1 plate & 1 chart.

In September 1913 Dr. SAMBON invited the Thompson-McFadden Pellagra Commission to send a representative to accompany him on a tour of certain islands of the British West Indies for the purpose of investigating the epidemiology of pellagra. The author was selected and reached Barbados in October. The island is about 21 miles in length by 14 in width, with an area of about 166 square miles [rather less than the Isle of Wight]. Its formation is coral with, on the eastern coast, an outcrop of clay. The island is flat, rising gradually from the western coast to an altitude of 1,100 feet. The coral is about 250 feet deep, resting on impermeable clay. The drainage is excellent. The climate is equable with but little variation—76°–86° F. The population (1911) is thus stated: White 12,063, black 118,387, mixed 41,533, total 171,983. There are 1,034 persons to the square mile. The chief industry is the cultivation of sugar cane. All the inhabitants of the island are supplied by pipes with pure water from a common source. The rainfall filters through the coral stratum and collects in the so-called subterranean rivers, from which it is pumped up. The chemical analysis shows a high degree of chemical purity; bacteriological examinations have been negative. The author writes: "As a sanitary measure the water supply of Barbados is most impressive." The houses are wooden and small, about 12 by 14 feet.

"Formerly it was customary, at night, to close all doors and windows, excluding practically all fresh air. Now the peasants are beginning to use open sash work for doors and windows, permitting free access of fresh air. We were informed that this sanitary improvement was one of the direct benefits resulting from emigration to the Canal Zone. It was stated that Barbadian laborers working on the Panama Canal lived under much better sanitary conditions than at home. On returning to Barbados they break away from the habits and traditions of centuries and put into actual practice some of the sanitary improvements to which they became accustomed on the Zone."

*Disposal of Excreta.*—With the exception of filariasis the most important prevailing diseases of known etiology are intestinal in character, owing to the faulty disposal of excreta. Of 1,235 premises inspected in 1913 more than 50 per cent. had no visible means of disposal. Of the cesspits in use few are impermeable. Excreta are frequently dumped on unoccupied land.

A table is given of foods imported and there is an account of the dietetic habits of the natives. The organisation of the medical service is described; it is regarded as "most excellent."

*Prevailing diseases.*—Typhoid fever has always prevailed extensively owing to the methods of disposal of sewage. Between January and October 1913 between 450 and 500 cases were notified. Diarrhoea, and both bacillary and amoebic dysentery are common. There are about 300 lepers, 150 of whom are voluntarily confined in a leper asylum. Tuberculosis has an extensive prevalence, which however is said to be lessening owing to the change in the construction of the peasants' houses.



No routine blood examinations have been made to determine the percentage of the population harbouring microfilariæ. Elephantiasis is said to be decreasing quite rapidly; the decrease is attributed to the mosquito control work initiated for the extermination of *Stegomyia fasciata* in 1908, *Culex fatigans* being controlled at the same time.

Malarial fever, as is well known, does not originate in Barbados. The author brings forward reasons for the absence of anophelines such as have already been submitted [this *Bulletin*, Vol. 5, p. 441, and elsewhere]. Occasional cases of beriberi are seen, always imported. The diet of the peasants is largely carbohydrate; almost all the rice imported is highly polished; however, they eat beans and peas habitually and "this fact probably accounts for its absence." Hook-worm disease is very prevalent. Yaws is not found, though very prevalent in Jamaica. Sprue is very common.

[Dr. G. C. Low examined the night blood of 600 Barbadians (negroes, mulatto, and whites) in 1900 and found 12.6 per cent. to harbour filariæ. (*Jl. Trop. Med.*, 1901. Vol. 4, p. 283-5).]

A. G. B.

**AMMERMAN (C. C.). Medical Experiences in the Amazonian Tropics.**—*U. S. Naval Med. Bull.* 1914. Apr. Vol. 8. No. 2. pp. 270-280. With 14 figs.

This paper, which has only recently come to hand, was read before the College of Physicians of Pittsburgh in November 1913. The author related some of the medical experiences met with during the years 1911, 1912 and the early part of 1913, while he was serving as divisional surgeon of the Madeira-Mamore Railway Co. in Brazil and Bolivia. This railway serves all that north-eastern portion of Bolivia east of the Andes Mountains that is drained by the Beni and Madre de Dios Rivers, and its purpose is to connect the ports above and below the Madeira rapids.

"The railroad is built on Brazilian territory, paralleling the Madeira and Mamore Rivers. It extends from Porto Velho, near Santo Antonio, in the State of Amazonas, south to Guajara-Merim, in the State of Matto Grosso. It is 366 kilometres, or about 227 miles, in length. It was commenced in September, 1907, and finished in July, 1912. The cost of construction was about 10,000 lives and \$32,000,000.

"An attempt to build this road was made in 1878, but was abandoned after about nine months and the death of nearly all the original party."

A hospital was maintained near Santo Antonio containing about 600 beds. Between November 1907 and December 1912 the total admissions were 31,360 and the deaths were upwards of 6,600. The medical corps consisted of about 25 physicians and surgeons, under the direction of Dr. Carl LOVELACE. The labourers and employees came from all parts of the world. The principal diseases met with were malaria, blackwater, dysentery of all kinds, abscess of the liver, yellow fever, beriberi, typhoid fever, tuberculosis, pneumonia, yaws, tropical buboes, uncinariasis, filariasis, and tropical ulcers. In this paper the author deals with malaria and yellow fever only.

He states that more disability, suffering and death were caused by malaria than by all other diseases and injuries combined. All the forms were seen, but by far the greater number of cases were estivo-autumnal. There was a great tendency to adynamic conditions and

many patients died in a few hours from the onset. After apparent recovery there was great liability to a return of fever at regular intervals of days, weeks or months; in the case of an American the attacks recurred every second month at the same time for eighteen months. Such sanitation measures as could be carried out were taken. Every man was instructed and urged to take from 5 to 10 grains of quinine daily. In treatment it was administered by every route. The author writes :—

“For intramuscular injections we used the ‘chloro-sulfate’ put up in glass ampoules each containing one-half gram. Our experience with this form of quinine medication was very gratifying. We administered it with a hypodermic syringe at all times and under all conditions—in the hospital, in the field hospitals, in camps, in the palm huts of laborers, and along the right of way, from our motor cars—and had very, very few bad results from sloughing or abscess. . . . Even had we gotten a great number of abscesses and ‘quinine sloughings,’ I would have continued to use it in this manner, believing that a live patient with an abscess is greatly to be preferred to a dead one without.”

His routine method of giving these injections is described. He states that different persons required different doses of quinine as a prophylactic and this dosage could be ascertained only by time and patience; in many cases attacks of fever could not be prevented by any dosage.

“In my own case, after several attacks of fever, I learned that 30 grains per day was necessary. If I dropped back to 25 grains per day I would soon have another attack. As a result of this observation, for over a year I took 30 grains in solution daily, and kept this up until after my return home, when the amount was very gradually reduced until the first of last September, when it was discontinued. I have both given and taken 160 grains per day, intramuscularly, for several days in succession, without any ill effects, with very little tinnitus, and no nausea. Such doses given in the United States would almost render one liable to a charge of malpractice. In spite of these large doses I did not see a case of quinine amblyopia or a case of permanent deafness, although temporary deafness was rather frequently noted.”

Yellow fever is endemic in the Amazon Valley; the natives pay little attention to it. It is frequently alluded to by them as “*fiebre patriótica*” because it removes foreigners, and more particularly “*gringos*.” Great precautions were taken on the railway to avoid the introduction of infection. One outbreak occurred in November 1911 in a town containing about 400 inhabitants. Owing to the measures taken there were no fresh cases after the first ten days. It was demonstrated that it is possible to fumigate successfully more or less openly constructed palm-thatched and palm-walled buildings.

“These buildings were completely covered with heavy canvas extending from the ground up to and over the roof and down to the ground on the opposite side. Both ends of the canvas were then buried under 6 or 8 inches of earth well tamped down, so that when finished the building was completely and thoroughly covered with this canvas; a half barrel of sulphur was placed within the building and ignited, the whole being then carefully kept closed and undisturbed for 24 hours. The floor and the ground under the floor would then be found covered with numberless dead mosquitoes which were removed and disposed of.”

The paper is illustrated by 14 photographs showing the type of country, of native, and of building.

A. G. B.

CARR (Donald). **The Diseases most met with in Persia and how they affect Europeans.**—*Jl. Trop. Med. & Hyg.* 1915. May 15. Vol. 18. No. 10. pp. 109–112.

The author's remarks refer entirely to the Central Persian highlands, and more particularly to the Province of Isfahan, which has been his headquarters for the last 20 years. The Isfahan plain is situated 5,300 feet above sea level and has a most delightful climate. The rainfall is only 4 to 6 inches in the year. There are probably not a dozen days on which the sun is not seen. There is frost for two to three months. Possibly owing to the altitude and the dryness of the atmosphere Persia "has a reputation for making people nervy."

Phthisis has lately been very much on the increase among the natives; the increase is attributed to their habit of sleeping many together in a small room without ventilation, and an additional cause probably is the prevalence of opium smoking; tuberculosis of the bones and joints is very frequent among them. Amoebic hepatitis and tropical abscess are not uncommon, and diarrhoea and dysentery are both serious. There have been very severe epidemics of typhus; the mortality amongst those who are looked after is not large; there has been no death amongst Europeans. Pediculi are universal amongst the poorer Persians.

There is malaria, but on the whole of a mild type, chiefly quartan, but benign tertian and estivo-autumnal fevers are also met with. The author can only remember seeing one case of malignant malaria. There was a serious outbreak of cholera in 1904. Relapsing fever is common in the Kerman district. Oriental sore is extremely prevalent, the face and hands being the most common sites; "if protected from irritation the sores usually will not ulcerate, in which case no permanent scar will be left." Ulcers containing spirochaetes and fusiform bacilli are not uncommon. Short attacks of fever frequently occur for which no definite cause can be found. Syphilis is common but signs of the congenital disease are rarely seen.

The most important disease from the European point of view is enteric fever. "Undoubtedly the water supply is chiefly to blame"; the natives are extremely careless in their use of the water. The author suspects that paratyphoid and allied affections are not infrequent. He notes that after five years' service nervous irritability manifests itself amongst the missionaries, which he attributes to excessive expenditure of nervous energy [see also this *Bulletin*, Vol. 3, p. 220 *et seq.*].

A. G. B.

REED (E. U.). **Medical Work in American Samoa.**—*U.S. Naval Med. Bull.* 1913. Oct. Vol. 7. No. 4. pp. 546–552. With 4 plates.

The health of American Samoa is looked after by the senior medical officer of the naval station, Tutuila. The population (1912 census) is 7,251, of whom 6,659 are Samoans and 179 whites. The author's period of service was September 1911 to April 1913. The most prevalent diseases were dengue, filariasis and elephantiasis, tuberculosis, yaws, hook-worm disease, ascariasis, Samoan conjunctivitis, typhoid and dysentery. Most of the deaths were due to tuberculosis, cancer,

filariasis and deep filarial abscesses, and dysentery. Three deaths in the Samoan hospital were attributed to Samoan treatments. Fifty-six operations were performed for elephantiasis and many for abscesses of filarial origin.

"Tr. ferri chloridi, in 2 cc. doses three times a day, continues to be the most effective treatment for acute filarial attacks and is followed to best advantage by potassium iodide; salvarsan, urotropin, and phenocoll have been tried without success. . . . Elephantiasis is located in the legs or genital organs in an undue proportion of cases; probably as a result of partial obstruction of the lymph glands from chronic leg ulcer infections and Samoan tattooing in almost solid colouring from waist to knees. The femoral and inguinal glands of such cases, when removed, are black with pigment."

Tuberculosis of lungs, glands, bones and joints is very prevalent. Only a few children escape yaws. About 70-90 per cent. of adult Samoans harbour the American hook worm, though only about 10 per cent. show appreciable symptoms. Typhoid fever was introduced from German Samoa in 1912 and has been spread chiefly by flies. The bacillary form of dysentery occurs in yearly epidemics, and is spread also by flies. Liver abscess has not been seen and only one case of amoebic dysentery, probably contracted in the Philippines.

A. G. B.

BREINL (A.). **On the Occurrence and Prevalence of Diseases in British New Guinea.**—*Ann. Trop. Med. & Parasit.* 1915. June 30. Vol. 9. No. 2. pp. 285-334. With 8 plates and a map.

This paper embodies the results of two journeys to the coastal belt of British New Guinea undertaken in July and August 1912 and July to September 1913. The coast of New Guinea east of Port Moresby, the capital, is fairly densely populated, the villages ranging in size from three or four houses to large settlements with about 3,000 inhabitants. The medical survey was carried out with all possible care and it is believed that cases of almost all the diseases prevalent in New Guinea have been encountered.

**Malaria.**—Malaria occurs with varying severity throughout British New Guinea. A spleen census was taken in children and blood films were made of those who showed considerable enlargement. Of 245 blood films taken from native children 132 contained malarial parasites—48 were malignant tertian, 34 simple tertian, and 27 quartan. Of Anophelines *Nyssorhynchus annulipes* and *Cella punctulata*, ten of the former to one of the latter, were found. It is thought extremely likely that the first named is an intermediary host in New Guinea.

**Filariasis.**—Thin smears were made from the day blood of a number of men, women and children. Thick films were not used; experience shows that they deteriorate more quickly than thin smears. Blood films could be taken in the day time only. The results indicated that natives living in the coastal belt of east and north-eastern New Guinea harbour filarial larvae in their blood to a greater extent than in the western parts. In the former the infection was about 17 per cent., in the latter about 5. Microfilariae showing nocturnal periodicity were found in some of the carriers. Morphologically the microfilaria of the New Guinea natives does not differ essentially from typical *Microfilaria nocturna*; a table of measurements is given. It is concluded that

there exists in British New Guinea a microfilaria morphologically identical with *Microfilaria nocturna*, but not possessing the typical periodicity, in addition to microfilariae which are only present in the peripheral blood at night time. Only one specimen of *Stegomyia pseudoscutellaris* was collected. The distribution of the disease was patchy. Cases of elephantiasis were seen in varying numbers; some are illustrated.

#### *Curious fevers—*

"Four cases of a curious and apparently specific fever were observed in villages on the south-east coast. All four cases showed the same clinical symptoms, which were sufficiently pronounced to suggest a specific fever.

"According to an account given by an employer of native labour, the disease sets in gradually, with an irregular fever. The first symptom noticeable is an icteric discoloration of the mucous membranes and of the sclerae, accompanied by pain in the splenic region. The patients suffer from more or less frequent attacks of continuous high fever, which may last for a few days or even a week, the temperature rising to 105° F. They emaciate considerably. The disease runs a chronic course—one of the patients had been ill for nearly two and a half years—improvement and relapses following each other at irregular intervals. The patients die finally with symptoms of great emaciation and pronounced icterus.

"The examination of the four cases showed a slight enlargement of the spleen and a very marked enlargement of the liver, which in one case extended to five finger breadths below the ribs; the sclerae and the mucous membranes were of a dark yellowish colour. The blood was decidedly anaemic.

"The disease is well known to the natives, and is called 'Gobora' in the Mailu district, and 'Tebi' further east."

No parasites were seen in the blood films excepting malarial parasites in two.

#### *A peculiar disease characterised by arthritis, osteitis and periostitis.—*

Joint affections and periostitis have been attributed by various authors to yaws. Such cases were met with in New Guinea. The irregular distribution, similarity of the clinical histories, and absence from tropical regions where framboesia is very prevalent, are considered to favour the supposition that the two complaints are separate clinical entities. The disease is very chronic.

"The most prominent symptom is an affection of one or more of the joints, ranging from a hot painful swelling to suppuration and the formation of sores with fistulae in the skin above the joints, which discharge an amber-coloured clear liquid containing floccular particles. At the same time spindle-shaped thickenings of the larger and smaller bones of the extremities become noticeable, which, especially when the small bones of the hand and foot are implicated, may lead to softening and resorption of the bone. Similar sores to those above the joints may make their appearance above the swellings of the bone.

"The disease affects natives of all ages, men, women and children although the majority were young persons. The youngest patient was about eight years of age. . . .

"The foot so affected closely resembles Madura foot without the presence of the typical granules in the pus. . . . In cases where one of the metacarpal or metatarsal bones is resorbed, the fingers or toes become either retracted or even displaced."

More than one case at first suggested nerve leprosy, but a thorough examination excluded this diagnosis. In a later stage ulcers are formed over the affected joints and bones, up to 25 centimetres in length. They show a tendency to spontaneous healing, forming dense scar tissue. The clinical histories are given of four cases and several photographs.

Those portions of this report which deal with skin diseases and ulcerations have been dealt with elsewhere [this *Bulletin*, Vol. 6, p. 132]. A map shows the distribution of malaria, and there is a list of Papuan mosquitos. The reproductions of photographs of patients with elephantiasis, leprosy, juxta-articular nodules, yaws, the affection of the joints and bones, ulcer tropicum, contracting sore, etc., are exceedingly good.

A. G. B.

**GILBERT AND ELLICE ISLANDS. Report on Mosquito-borne Diseases in the Gilbert and Ellice Islands.** [Senior Medical Officer B. C. N. O'REILLY.]—5 pp. f'cap. Received in Colonial Office, Aug. 16, 1915.

In his Preliminary Report on Mosquito-borne Diseases in the Gilbert and Ellice Islands Protectorate (March, 1915) the Senior Medical Officer, B. C. N. O'REILLY, states that the Protectorate is remarkably free from such diseases, a freedom which he attributes to its isolation and geographical features. "On a mainly superficial and hurried examination" Anopheles have not been found. It is noted that there are twenty-six islands in these two groups and that with ordinary communication it would take "about three years" to obtain statistics of mosquito-borne diseases. All the specimens collected are *Stegomyia*. In the Gilbert Islands no mosquito-borne disease is endemic. In the Ellice group elephantiasis is very prevalent and in the Gilbert Islands all the conditions for its spread are found. There are three sources of danger of its introduction—vessels recruiting labour from both groups; mission ships "with the usual exceptions to rules and enactments"; communication by means of trading steamers. It is urged that no person be allowed to travel to or from the Ellice group without a medical certificate stating that he or she is free from microfilaria. If the disease gets a hold in the Gilberts it will be a heavy burden of expenditure.

From correspondence between the High Commissioner of the Western Pacific, a missionary writing from a Theological Training College in Samoa, and the Resident Commissioner, Gilbert and Ellice Islands Protectorate, it appears that the London Missionary Society seeks to obtain relaxation of the rule whereby Ellice women are prohibited from visiting Samoa for training. The Resident Commissioner is against such relaxation. He says that there can be no doubt that this Society is responsible for having brought elephantiasis into the Ellice Islands from Samoa, in the persons of the native pastors and teachers, and that Samoan pastors are now being introduced into the Southern Gilberts. At present only two cases of this disease are known in the Gilberts, one of which has been removed. He advocates that natives of Ellice and Samoa should be prevented from entering the Gilberts till a thorough investigation of the matter has been made. He notes also that Ellice missionaries are visiting New Guinea and are likely to take elephantiasis there, if it does not already exist, and to bring back other tropical diseases to Ellice. He submits that "in the endeavour to carry on the good work of the spread of Christianity, mission societies are apt to overlook the danger of the spread of tropical diseases."

[The Gilbert Islands lie, roughly, half way between the Sandwich Islands and Australia, the Ellice Islands about 10° to the south. Samoa lies to the south-east of each group. The Gilbert and Ellice groups consist of coral atolls. Their total area is 180 square miles, their population 30,000 natives (Malayo-Polynesians), 300 Asiatics and about 300 Europeans. For an account of the diseases prevalent in New Guinea see above. Filarial infection and elephantiasis are noted.]

A. G. B.

**KINDLEBERGER (C. P.). An Epidemic of Measles and Mumps in Guam.**

—*U.S. Naval Med. Bull.* 1914. Apr. Vol. 8. No. 2. pp. 243-247.

From careful enquiry it was determined that measles was introduced into Guam\* in 1861 and 1888. The first epidemic was a severe one, the second much milder. In May 1913 a case was discovered at the capital, Agaña. Infection was traced to a native stevedore who developed measles in April and was probably infected from a United States Army transport. The disease soon became epidemic. In September the last two known cases of measles developed in Agaña. Of 1,172 houses in that town 718 became infected. The disease caused only 43 deaths, 42 among children. Tables show the complications and the causes of death. Fifteen deaths are ascribed to entero-colitis, 7 to forms of pneumonia and 5 to tuberculosis. There occurred in all at Agaña 6,884 cases. Of the natives on the island 56·23 per cent. developed the disease and the known deaths were only 0·625 of 1 per cent.

It is believed that mumps was unknown on Guam prior to this epidemic; there is no word for the disease in the Chamarro language. It was introduced from an American ship in January 1913 and at the end of the month had become epidemic. There were no deaths attributable to the disease and few complications. In December the epidemic was believed to be over. 6,320 cases were recorded, constituting 51·59 per cent. of the native population.

A. G. B.

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\* Guam is the largest of the Iadrone or Marianne Islands, lies 1,500 miles east of Manila and contains about 207 square miles.

## BOOK REVIEWS.

RILEY (Wm. A.) [Ph. D.] & JOHANNSEN (O. A.) [Ph. D.]. **Handbook of Medical Entomology.**—ix + 348 pp. Roy. 8vo. With frontispiece and 174 text figs. 1915. Ithaca, New York: The Comstock Publishing Co. [Price \$2.00.]

It is no disparagement of this excellent handbook to say that it will find its most useful employment in the hands of the entomologist who aspires to co-operate intelligently with medical and sanitary colleagues. To the medical student also, while still in that larval "preliminary scientific" stage where he is inclined often to regard his pabulum of zoology with some repugnance or reluctance, many parts of the book will be a fine tonic. But to the active medical profession, and particularly to that part of it which works on those frontiers of civilization where insect agencies have, perhaps, their fullest swing against human flesh, and the assistance of the entomologist is far to seek, its value is hardly so obvious; for much of its entomological ingredient is too technical for anyone who is not already well grounded in entomology and, on the other hand, there is more of the "medical" ingredient than is either requisite or necessary for those who are obliged to study animal pathology independently.

The book consists of eleven chapters besides a general introduction (forming Chapter 1) and an ample bibliography.

Chapter 2 deals with arthropods that are directly venomous, among which are enumerated spiders (with particular attention to the notorious *Lathrodectes*), scorpions, certain mites and ticks, centipedes, and of insects those which bite, or sting, or possess urticating hairs or vesicating secretions. The list of venomous species does not profess to be complete, but the toxic aspects of typical forms are discussed, and many of these forms are figured.

Chapter 3 treats of arthropod parasites of man. The authors adopt BRAUN's definition of a parasite, and so, along with such unequivocal parasites as itch-mites, ticks, lice, bedbugs, fleas, and bots, which are either structurally or physiologically adapted for living exclusively on or within another living organism, they include all the blood-sucking Diptera that attack man. The *Pentastomida* are not enumerated in the list. The habits and the pathological effects of the parasites are described, and methods of compassing their destruction, as well as of treating the smarts and lesions that they cause, are discussed. The chapter contains a good many figures in the text; those illustrating certain parasitic skin diseases are not very informative; those representing *Auchmeromyia*, the male of *Pediculoides*, and the mouth-parts of *Culicoides*, *Simulium*, and *Tabanus* are not very good.

Chapter 4 enumerates some of the mites, myriapods, and larvae of flies and other insects that have been found in the natural passages of the human body, or in the viscera, or in neglected wounds—under the common heading of accidental or facultative parasites; it also contains a key for the identification of the dipterous maggots that may be found in such situations.

An account of the housefly, under the heading "Arthropoda as simple carriers of disease" occupies almost the whole of Chapter 5, "simple" carriers being those that disperse germs of any kind indiscriminately and accidentally. The natural history and habits of the house-fly, in all stages of its existence, are described, its mode of distributing microbes, etc., are considered, and the ways and means of controlling the insect are discussed.

In Chapter 6, which is entitled "Arthropods as direct inoculators of disease," some instances of mechanical infection by biting-flies are given, and the history of the discovery of the connection between fleas, rats, and bubonic plague is narrated.

Chapters 7 to 10 treat of arthropods as essential hosts of specific pathogenic organisms. They cover well-known ground, but are fuller and more explicit in the accounts of the organisms, their development-cycles, their pathological effects, their historical precession, and matters of that kind,



than they are in their treatment of the specific arthropod carriers. In the section devoted to malaria the impressive arguments of the American physician Dr. A. F. A. KING in favour of a mosquito theory are summarised at considerable length, but to call such a well-reasoned clue, to one of the roads that may lead towards the hidden truth, circumstantial evidence in favour of the mosquito-theory, which depends for verification upon a critical examination and adjustment of several tedious and tortuous lines of proof, is to rate a single phase of pure ratiocination rather too highly. The historical surveys, however, are good, though the epoch-marking researches are not set in any strong relief, the authors apparently leaning to the comfortable doctrine (*vide* the introductory chapter) that great discoveries are as much dependent upon the hour as upon the man, and are gradually turned to shape by the wheel of progress, rather than suddenly bodied forth in any fine frenzy of imagination and inspiration. It may be pointed out that FEDCHENKO'S discovery of the relation of *Cyclops* to guinea-worm seems to have been first communicated to the world in 1869 (not 1879 as the date here appears), and it has been pertinently suggested that the germanized version of the name of this illustrious naturalist ("Fedtschenko") is no longer appropriate.

In chapter 11 the conditional hypotheses of insect transmission of the noxae of infantile paralysis, pellagra, and verruga peruviana are separately considered.

The final chapter consists chiefly of long synoptic tables for the identification of Arthropoda specifically hurtful to man: to those who are conversant with entomological methods they will be extremely useful, but they are too technical for those who are not.

A. Alcock.

**EALAND (C. A.) [M.A.]. Insects and Man: An Account of the more Important Harmful and Beneficial Insects, their Habits and Life-Histories, being an Introduction to Economic Entomology for Students and General Readers.—343 pp. Demy 8vo. With 16 plates & 100 figs. 1915. London: Grant Richards Ltd. [Price 12s. net.]**

This book is intended as an introduction to economic entomology for students and general readers; its range, therefore, is more extensive and its method less intensive than corresponds with the limits and objects of this *Bulletin*. It deals with Arthropoda in their dynamic aspects, as powers of evil and good, and does not profess to take heed of their structure, classification, and zoological relations. Its chapters are of the nature of independent essays, and only those that fall within the proper scope of a medical journal can be considered here.

The chapter entitled "Insects and Human Disease" contains instructive accounts of the infections that are known to be spread among mankind by Arthropoda. The specific diseases attributable to mosquitos, house-flies, tsetse flies, fleas, and ticks are severally reviewed, and the salient biological facts regarding their nature, incidence, and specific manner of dispersal are considered. The doubtfully noxious *Simulium* is included in the survey, but the body-lice and their proven morbid activities are omitted, and no reference is made to the dangers that are believed to lurk in bed-bugs. The illustrations include figures of mosquitoes and other carriers, and typical views of the breeding places of some of them.

Another chapter "On some Human Parasites" contains a good deal of useful information about the flea, the bed-bug, lice, the maggots of *Dermatobia*, *Cordylobia*, *Auchmeromyia*, and *Chrysomyia*, and certain mites. There are numerous figures, most of which are very good, but those of the bed-bug and the larva of the flea are poor and unnatural.

The chapter on insect enemies of livestock is rather more discursive in character, and does not profess to give an exhaustive list of parasites and pests. Along with some good figures it includes a general account of ticks, mentioning some of the tick-borne fevers of domestic animals, and also some well-selected intelligence about bots and other Oestrid maggots, the blow-flies that attack sheep, the Hippoboscids flies, biting lice, the

mites that cause scab, and some of the parasites of poultry. The author indulges in the sport of showing the engineer hoist with his own petard, by adding some remarks on pébrine and the kindred bee-disease to this chapter.

In the essay on beneficial insects there is a section—of interest chiefly to the curious—on insects in medicine.

Household insects have an illustrated chapter to themselves, which is chiefly remarkable for a long excursion on the New Orleans or Argentine ant.

A final chapter on insect control deals exclusively with an aspect of the subject which, though of great importance to the agriculturist and horticulturist, is of little moment to the sanitarian—namely, the suppression of insect pests by subjecting them to the attacks of their natural enemies, parasitic and predaceous.

A. Alcock.

**STUDI DI MEDICINA TROPICALE. Vol. 1. Collezione di Pubblicazioni Scientifiche sull' Eritrea. Compiuti da Ufficiali Medici e Veterinari de R. Corpo di Truppe Coloniali dell' Eritrea.**—xvi + 230 pp. With 75 text-figs., 1 map & 2 coloured plates. Pubblicato a cura del Governo della Colonia Eritrea, Asmara. 1914. L'Istituto Italiano d'Arti Grafiche di Bergamo. [Price L. 8.]

The reviewer wonders how many readers of this *Bulletin* could say off-hand in what manner the Italians first obtained a footing on the Red Sea Coast. Thinking that occupation began in 1885 at the time of the quarrel with Abyssinia he looked the matter up only to find that he was wrong. Most colonies have originated in a desire to extend national trade. A rich company with a royal charter would sail for the chosen area to establish factories, or a firm with some experience of foreign trade would send out its agent. If a footing could be obtained a trade centre was established. In most cases trouble ensued sooner or later either through the tyranny of the merchants or the cupidity of the natives. Traders were killed and troops sent out to avenge the death. Land was acquired either by conquest or by treaty and the colony was started under the national flag. Eritrea began in what may be called the orthodox manner! In 1869 the "Rubattino Steam Ship Company" purchased a strip of coast near to Assab and used it for trade until 1882 when the Company sold its rights to the Italian Government. Attempts to appropriate more of the country led to war with Abyssinia and the years between 1885 and 1896 were full of strife, the Italians being more than once defeated by the Abyssinians. In the end Italy became the possessor of Massawah and the coast far to the north of the original area round Assab.

It was not therefore until these years of strife were over that the medical and veterinary officers with the colonial troops could turn their attention to the diseases of the colony and their prevention. The result of the work done is in part contained in the work under review. *Studi di Medicina Tropicale* forms volume one of a series with the title, *Collezione di Pubblicazioni Scientifiche sull' Eritrea*, and it contains the work of eight contributors. Pride of place is given to a full clinical essay on malaria (Dr. MIGNACCA). Herein are described those conditions favouring the origin and spread of malaria, its symptoms, effects on various organs of the body and its treatment. This and the other essays which the volume contains are furnished with a bibliography. Dr. M. CARPANO of the veterinary service contributes a well illustrated article on *Trypanosoma theileri*, which attacks the various breeds of cattle with differing severity. Together with this organism others are found in the blood in many cases. Such are:—*Piroplasma bigeminum*, *T. abyssinica* and *Sp. bovis*. Photomicrographs are shown of these mixed infections. Pages 33 to 115 contain the results of Dr. VICENZO de MARZO's experience of the many diseases found in the regions of Barca and Gasc-Setit. General as well as strictly tropical diseases are dealt with and the illustrations, as is the rule throughout this work, are excellent.

Variety of subject is one of the characteristics of the work under review. It includes an article on poisonous snakes and their distribution in Eritrea. The poison fangs and venom of colubrine and viperine snakes are described and the former illustrated. Nothing new is to be found under the head of treatment. Many of the birds of Eritrea are infested with parasite *Haemamoeba*. Dr. CARPANO gives a list of such birds and describes fully the developmental cycle of *Haemoproteus Danilewskyi*. This article contains two coloured plates showing developmental forms of the parasite and photomicrographs displaying *Haemoproteus* as it is found in the blood of *Gypoggeranus serpentarius*, also, in various stages of development, in the blood of *Coracias abyssinicus*. The mosquito hosts and carriers appear to be *Culex pipiens*, *C. annulatus*, and *C. fatigans*.

The next article, another contribution from Dr. MIGNACCA, deals with *Filaria medinensis*, the guinea worm, frequently found in several of the districts of Eritrea. Although containing nothing new the article is interesting and well written. There are two theories as to the method by which the worm enters the bodies of its victims. Some believe that the young worm penetrates the skin of bathers and others walking about in infected water. No actual proof of such penetration is produced. Moreover, it is known that the larval *Dracunculus* spends one stage of its life in the body of one or more species of *Cyclops*. LEIPER found that a solution of hydrochloric acid, equal in strength to the human gastric juice, killed the *Cyclops* setting free the filariae. It would seem therefore that the guinea worm cannot infect man until after the "Cyclops stage." It is most probable and generally accepted that it is through swallowing infested *Cyclops* that man becomes infected. However, as Dr. MIGNACCA recognizes the existence of both theories he is careful to advise protection of the feet and sterilization of drinking water.

The remaining articles do not call for any particular notice. They deal with the teeth of the native inhabitants of the colony, accidents and other cases treated in hospitals, with an epidemic of smallpox and with the climatology of the high lands in Eritrea.

J. H. Tull Walsh.

ASHBURN (P. M.). [Major, Medical Corps, U.S. Army]. **The Elements of Military Hygiene especially arranged for Officers and Men of the Line.**—2nd Edit. viii + 351 pp. Crown 8vo. 1914. Boston and New York: Houghton, Mifflin Co. [Price \$1.50 net.]

The second edition of Major Ashburn's "Elements of Military Hygiene" has appeared at a singularly appropriate moment when the necessity for such a manual, written on popular lines and intelligible to the executive of our rapidly growing armies, is sufficiently apparent and the book loses none of its value from the fact that it concerns itself with the training and health of recruits for the United States Army, of which the author himself is a distinguished member. The subject matter is divided into three main parts; the first of which concerns itself with the recruit and his environment; the second with the causes of disease; the third with the prevention and control of epidemics; while there is a terse and well expressed supplement dealing with the prevention of mental and nervous diseases. The work is written in a bright style and explains with singular clearness and in non-technical language all essential points in the examination, training and general health of the recruit, as well as giving simple descriptions of the diseases of military importance and chapters on camp sanitation.

In the examination of the recruit it is of interest to note that the author takes a thoroughly sensible view of the problem of varicose veins; in this the reviewer is in entire agreement that, if moderate in degree, they ought not to present *per se* a bar to active service. The chapter on personal hygiene is well written, more especially the portions devoted to sexual problems and the question of alcohol.

In the subsequent chapter on foods and their preparation several pages are devoted to a recapitulation of the dietary supplied to the U.S. Army

which is on a very liberal scale; in a paragraph on the hygiene of the kitchen due attention is directed to the necessity of examining the chief cook and his staff for past or present evidences of typhoid fever. A full description is given of the various types of incinerator generally in use in camp and the reviewer is in agreement with the author that, however efficient, they require moderately intelligent handling as it is of course possible to smother almost any fire.

As showing the comprehensive nature of the book, in a chapter on hygiene of hot and cold climates the author devotes considerable space to the consideration of the special conditions encountered in the Panama Canal Zone.

In dealing with the prevention of epidemics the carrier problem, both human and invertebrate, in its bearings on military medicine is thoroughly considered; the conveyance of typhoid by means of water and shell fish is still, considering the high rate of incidence of that disease, a burning question in America. This portion of the work ends with a recapitulation of the beneficial effects of cholera and typhoid vaccine, which appear to have been fully borne out during the present war.

The conspicuous part played by the author in the investigation of insect-borne disease is a sufficient guarantee that this important subject receives adequate treatment at his hands and all the more familiar methods of mosquito destruction and prevention are described. One has no hesitation in recommending this book not only to combatant officers, but also to members of the profession about to enter the rapidly-increasing medical corps of the British Army.

P. H. Bahr.

KENWOOD (H. R.). [Temporary Lieut.-Col. R.A.M.C.; Professor of Hygiene and Public Health in the University of London, etc.]. **Health in the Camp: A Talk to Soldiers.**—vi + 58 pp. Demy 16mo. 1915. London: H. K. Lewis & Co., Ltd. [Price 3*d.* net. Special terms for large quantities.]

This little book, the scope of which is accurately described by the title, deals with the "germs of disease" and how to guard against them, "the fly danger," "some principles of camp sanitation," "anti-typhoid inoculation," "food," "drinking water," "fresh air," "venereal diseases," "alcohol," "personal cleanliness," "the teeth," "vermin," "sanitary discipline," in fact, "what every soldier ought to know." It is written clearly and in an interesting manner and if read intelligently can hardly fail to benefit the reader and his fellows and to forward health in the camp. A wide circulation may be wished for it apart from the fact that any profits are to go to the Soldiers' and Sailors' Families Association.

A. G. B.



## TROPICAL DISEASES BUREAU.

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[No. 7.]

## SLEEPING SICKNESS.

BRUCE (David). **The Croonian Lectures on Trypanosomes causing Disease in Man and Domestic Animals in Central Africa.**—Delivered before the Royal College of Physicians of London on June 17th, 22nd, 24th, and 29th, 1915:—

*Lancet.* 1915. June 26, pp. 1323–1330. With 11 figs.; July 3, pp. 1–6. With 3 figs.; July 10, pp. 55–63. With 6 figs.; July 17, pp. 109–115. With 2 figs.

*Brit. Med. Jl.* 1915. June 26, pp. 1073–1078. With 12 figs.; July 3, pp. 5–10. With 5 figs. and a map; July 10, pp. 48–53. With 6 figs.; July 17, pp. 91–97. With 9 figs.

The subject matter of Sir David Bruce's Croonian Lectures is well known to readers of this Section of the *Tropical Diseases Bulletin* and does not call for detailed notice. He confines himself to consideration of the disease-producing trypanosomes of Central and Southern Africa, those namely which he has had the opportunity of studying in the field under natural conditions.

Lecture I. deals with classification of the trypanosomes, which in common with most English workers he bases chiefly on morphology, pathogenic action on animals and mode of development in the tsetse fly when such occurs. The grouping is that reproduced in this *Bulletin*, Vol. 5, p. 83. The characters of the three groups are summarised.

Lecture II. is headed *Glossina morsitans: Trypanosoma brucei: Wild Game*. Interesting details are given of the author's investigations in Zululand, 1894–96, and the conditions under which they were made.

Lecture III. is entitled *Trypanosoma gambiense* and Congo Sleeping Sickness.

Lecture IV. deals with the trypanosomes of groups B and C, i.e. *T. pecorum*, *T. simiae*, *T. vivax*, *T. caprae*, the last few paragraphs being given to prevention of the trypanosome diseases.

The lectures are freely illustrated and contain a map showing the localities in which Nyasaland Sleeping Sickness has occurred. They render more generally accessible the observations and conclusions of the author and his colleagues in various expeditions to Africa.

A. G. B.\*

\* Dr. Warrington YORKE is absent on military service.

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RINGENBACH (J.) & GUYOMARC'H. *Notes de Géographie médicale de la Section française de la Mission de délimitation Afrique équatoriale française-Cameroun en 1912-1913. Maladie du Sommeil.*—*Bull. Soc. Path. Exot.* 1915. July. Vol. 8. No. 7. pp. 515-546. With 1 map.

In this long paper the authors deal with their observations on sleeping sickness between the coast near Libreville and the Ouahm river, a tributary of the Shari. It is illustrated by a map which shows in a graphic manner the quantitative distribution of sleeping sickness and the distribution of tsetse flies. They refer to the chart drawn up by the French mission for the study of sleeping sickness in the Congo published in 1909\* and to observations made since; in this chart there was no attempt to indicate the degree of morbidity in the various regions. They note that previously nothing was known as to sleeping sickness between the Sangha and Oubanghi rivers. Much of the paper is chiefly of local interest. The authors commence by saying that sleeping sickness in this region must be put by the side of small-pox, and in certain districts is worse than small-pox. When they reached a village their *modus operandi* was as follows:—They put the men, women, and children in three groups and noted the different diseases visible to the naked eye. They then put aside those who appeared possible sufferers from sleeping sickness; such complained of headache, fever, lassitude, weakness, pains in the limbs, or showed enlargement of the glands, oedema of the face or feet, discolouration of the hair, emaciation, cerebral excitement, etc.—one or more. Some space is devoted to the difficulties met with in such an enquiry made in regions hitherto little visited by Europeans. Sleeping sickness was not diagnosed except after the discovery of the trypanosome in the blood or gland juice. The blood was examined as a rule in one preparation for ten minutes before a negative conclusion was reached. Each group of glands was, if necessary, the subject of numerous punctures. They did not centrifuge the blood or cerebro-spinal fluid. The country through which they passed is considered under four headings:—

1. North of the Gaboon. Ivindo basin.—Between the sea and the Ivindo, which is a tributary of the Ogowe, 1,022 natives were examined; eight were found to be infected, giving a percentage of morbidity of 0·78. Details are shown in a table. It is concluded that the inhabitants of this region are very slightly affected by sleeping sickness, and this is attributed to the vigorous constitution of the natives who get abundant food, and to the small extent to which it has been visited by foreigners. The disease must have been introduced by Loangos, Bakongos or Bayas in the service of the Administration or of merchants. These races, among whom much sleeping sickness is found, furnish the greater part of the labour in this part of French Equatorial Africa. Among the porters of the Mission two such cases were found and turned back.

2. Basin of the Sangha.—Here the disease has existed for a long time. References and quotations are made from the writings of

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\* G. MARTIN, LEBOEUF, ROUBAUD: *Rapport de la Mission d'Etudes de la Maladie du Sommeil au Congo Français, 1906-1908.* (Société de Géographie). 721 pp. With 8 plates, 1 map and 135 figs. 1909. Paris: Masson & Cie.



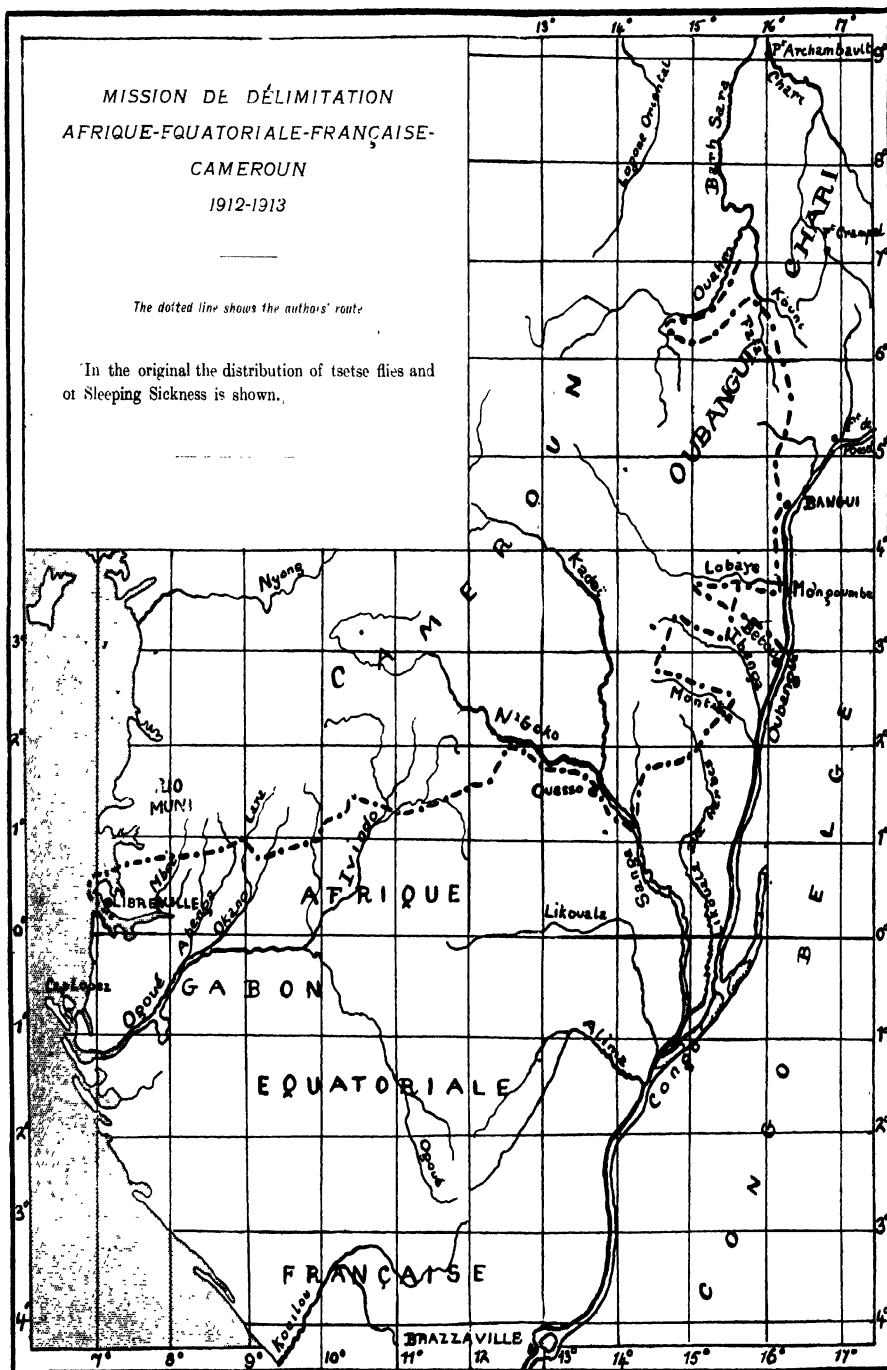


MISSION DE DÉLIMITATION  
AFRIQUE-EQUATORIALE-FRANÇAISE-  
CAMEROUN

1912-1913

The dotted line shows the authors' route.

In the original the distribution of tsetse flies and of Sleeping Sickness is shown.





MILLOUS, HECKENROTH, KERANDEL, OUZILLEAU, and AUBERT, most of which refer to the Upper Sangha. The itinerary of the authors led them much more to the east, to the country between the Sangha and Oubanghi rivers. Some space is here given to native ideas on sleeping sickness. In eleven villages visited 947 natives were examined and 72 were found to be infected, giving a percentage of 7.6 among those examined. The details are given in a table. In one village 72 persons were examined and 15 were found to be infected, and it is noted that all these were persons who had come to assist in transport and who consequently appeared to be healthy. With regard to this and two other villages in which there was a large percentage of infected people, the authors discuss the mode of infection without arriving at a satisfactory conclusion; one was not near water and tsetse flies were rare. Out of 21 infected children seen in the Sangha basin 17 were above the age of 5 and it is noted that children of tender age rarely leave their villages, whereas the older ones accompany their elders fishing or in canoes. The case is cited of a European who eleven months before had anaesthesia of his legs with loss of knee jerk and diminution of the pupillary reflexes and had been treated for syphilis. When seen he had oedema of the feet and his calves were tender to pressure. Trypanosomes were found in one of his glands. He had probably contracted infection sixteen months before.

3. Basin of the Oubanghi.—Detailed information of these people has been obtained by LEBŒUF, and by HECKENROTH. The authors worked principally on three large tributaries of the Oubanghi, the Motaba, the Ibenga and the Lobaye, where nothing was known in regard to sleeping sickness. Among 1,481 persons examined in 16 villages 216 were found infected, giving a percentage of 14.5, twice as high as that obtained in the Sangha basin. Most of the cases were found in villages on the banks of the Motaba and Ibenga rivers. One-third of the population of the Motaba river was infected and this is probably below the truth, for only people in apparent good health were examined. Instances are given in which more than one inmate of a house was infected. These are believed to demonstrate the existence of family contagion and to explain the disappearance of whole villages. On the Lobaye river the percentage of infection is much less, only 4 or 5 per cent. This is perhaps to be attributed to the better nourishment and higher grade of living of the natives concerned.

The authors made three canoe journeys on the Motaba river and tried a means of preservation against tsetse bites. Half of their 16 canoe men were smeared with palm oil and the other half served as controls. In two hours, whilst 119 tsetse settled on the bodies of smeared natives, 173 alighted on the others. It is noted that the former did not remain long and bit but rarely, whilst the latter did not leave till they had become engorged or had been chased away. It is concluded that this process had some effect. It is noted that for protection against insect bites natives of the Sangha anoint themselves with palm oil sprinkled with powder from a red wood, which acts at once as a protection and as an ornament.\* In this region three

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\*Compare the ointment used by the Ngombi tribe (*Sleeping Sickness Bulletin*, Vol. 2, p. 126) and the Rev. A. R. RUSKIN's further observations thereon (*loc. cit.*, p. 368).

patients were found with psychical symptoms of a special kind. Two of them, aged 10 and 12, had that form of ambulatory automatism which is called by REGIS "dromomania." They would get up and move away in one direction, return and go off in another without object and as if impelled by necessity. Their movements were irrational and unconscious. Reference is made to the memoir of G. MARTIN and RINGENBACH\*.

4. Basin of the Ouahm.—Previous information about this region was obtained by KERANDEL in 1907, some of whose observations are quoted. He did not find the disease north of Carnot on the Upper Sangha (5° N.). The population here was hostile and very few examinations could be made. It is stated that at only two villages are they of value. In one of these 82 were examined and 16 were found infected; at the other 59, and 9 infected. From their investigations and information obtained they concluded that the disease exists in the valleys of the Koumi, Fafa and on the banks of the Ouahm. There seems little doubt that it has been introduced since 1907 by Hausa traders from the south and east, who go to purchase rubber, and attention is drawn to the fact that European colonisation has especially helped in the dissemination of sleeping sickness. At present the Logone river is believed to be free, but when the country becomes more settled it is thought that the Hausas will take the disease there.

A few remarks are added on the epidemiology. Man appears to be the sole reservoir of the virus in the country passed through; big game is relatively rare. Transmission seems to be effected directly in a purely mechanical way, and indirectly. Indirect transmission is accomplished by tsetse flies. Other biting insects may play the part of mechanical vectors. In one village where 12·5 per cent. of the population were infected tsetse flies were very rare. *G. palpalis* was met with everywhere along the banks of rivers; other tsetse flies in places stated.

As to prophylaxis, the authors recommend the injection of remedies like atoxyl to sterilise the patients for at least two months, and draw attention to the excellent results obtained by OUZILLEAU [see this *Bulletin*, Vol. 6, p. 175]. The protection of districts free from the disease must be secured by the careful inspection of natives who seek to enter them.

A. G. B.

YORKE (Warrington) & BLACKLOCK (B.). **The Reservoir of the Human Trypanosome in Sierra Leone.** [Being the Third Report of the Thirty-second Expedition of the Liverpool School of Tropical Medicine 1914-1915.]—*Ann. Trop. Med. & Parasit.* 1915. July 31. Vol. 9. No. 3. pp. 383-390.

During the authors' stay in Sierra Leone two cases of sleeping sickness were brought to their notice, in a mother and child who lived four miles from Freetown. Trypanosomes were first seen in the mother's blood in an examination for malarial parasites about the beginning of 1914. She received an injection of salvarsan and returned home.

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\*Troubles psychiques dans la maladie du sommeil.—*L'Encéphale*. 1910. Ann. 5. 1 semestre. No. 6, pp. 625-671; 2 semestre. No. 8, pp. 97-119.

When seen in December her condition was good; trypanosomes could not be found in the blood or gland juice, but of two rats inoculated with blood one showed trypanosomes 38 days later. A trypanosome was found in the blood of the child (a boy aged 8) in December, also in the course of an examination for malarial parasites. Two rats inoculated from him failed to become infected and subsequent examinations of his blood were negative. He had no puncturable glands. The above records show that sleeping sickness is very chronic in Sierra Leone and very difficult to recognise.

The authors discuss the question of reservoirs and conclude that while wild game is the chief reservoir for human trypanosomiasis in South Central Africa man plays this part in Sierra Leone. There is however another possible source, domestic stock. They recall that the Sleeping Sickness Commission of the Royal Society in an examination of 17 cattle for *T. gambiense* in Uganda found one infected. Cattle are not bred in Sierra Leone, but are imported in large numbers from French Senegal. From a herd of 90 Government cattle nine (every tenth animal) were chosen for the purpose of inoculating their blood into rats; in one case the rat showed infection with what is believed to be a human trypanosome in fourteen days. The ox appeared quite healthy and direct examination of its blood was negative. The trypanosome isolated was polymorphic, had no posterior nuclear forms, and was indistinguishable morphologically from the trypanosome isolated from the human case. Tables showing the results of inoculation of this strain and the human strain respectively into rats and guinea-pigs are given. In each case infection when obtained was very chronic, and in many animals failed. The authors are of opinion that the ox trypanosome is *T. gambiense* and that cattle form a reservoir of infection in Sierra Leone.

As regards the importance of this source of infection we require to know whether the animals harbour the trypanosomes for long periods without showing signs of disease and what percentage of animals is infected. Four months later the ox was in perfect health. The authors note that this trypanosome was found largely by chance. A direct examination of blood of 143 cattle was negative for *T. gambiense*. Moreover, rats often fail to become infected, so that it will be hard to ascertain the percentage of infected cattle.

Reference is made to some observations of MACFIE on the transmission of the human trypanosome described by him in Nigeria. He holds that there is an unknown vertebrate reservoir, man not serving in this capacity [see this *Bulletin*, Vol. 5, p. 91]. Reasons are given for rejecting this hypothesis. "There is no evidence which would lead us to believe that man does not constitute a most important reservoir of the human trypanosome of West Africa." The existence in domestic stock of a potential reservoir of *T. gambiense* must, however, be taken into account.

[Besides the observations of BRUCE and his colleagues in Uganda, the authors might have noted those of KLEINE and ECKARD in the Tanganyika region [this *Bulletin*, Vol. 2, p. 347]. In an examination of 5 cattle, 55 goats, and 25 sheep from districts heavily infected with sleeping sickness one ox, one goat, and one sheep were found to be infected with a trypanosome which, for reasons stated, was believed to be identical with *T. gambiense*.]

A. G. B.

DANIELS (C. W.). Further Histories of Cases of Trypanosomiasis treated in England, and Further Cases.—*Jl. Trop. Med. & Hyg.* 1915. July 15. Vol. 18. No. 14. pp. 157–159.

In 1911 and 1912 the author recorded cases of this disease in Europeans who had been under observation at the London School of Tropical Medicine [see *Sleeping Sickness Bulletin*, Vol. 4, p. 18, and this *Bulletin*, Vol. 1, p. 273]. In the last paper a table was published showing that eleven cases were free from symptoms. These have not all remained so, and reference to the table shows that three have died. Of the first five cases, diagnosed before atoxyl was introduced, the author writes as follows:—

“Two had recovered, and are still in good health, thirteen years or more after the onset, but one is of special importance as the probable date of infection was 1900 to 1901, and she then had severe iridocyclitis, which necessitated the removal of one eye. Since then, though she has been free both from symptoms and also from parasites and was treated with atoxyl, and for the last three years has been resident in Canada, she has had iridocystitis [*sic*] of the remaining eye, and as there has been no chance of recent re-infection, suspicion is aroused that in this disease late manifestations corresponding to the parasymphilides may occur.”

Of the next five cases, treated by atoxyl, one, ‘E. G.’ (No. 10) died with nerve symptoms of a rather indefinite character after having been free from parasites and symptoms for 18 months. Apropos of another who died after two years good health the author remarks:—

“The possibility of late or para effects in this disease as in syphilis will have to be faced and the analogies of the late stage of the one—sleeping sickness and iritis—with the late stages of the other—general paralysis of the insane and eye lesions, etc.—renders this possibility more probable.”

In the present paper the cases are grouped according to the region where the disease was acquired. The Nigerian cases are grouped separately as some of them may belong to the strain described as *T. nigeriense*.

Affections of the eye are discussed, especially iridocyclitis. The author says that probably it is more common than the notes indicate, as at first eye troubles were attributed to arsenical treatment. The table shows the occurrence of these symptoms. With reference to the Nigerian cases he writes:—

“Very small forms are described as the characteristic of the true *T. nigeriense*, but Wenyon finds similar small forms in rats infected from No. 26, though clinically there is nothing to distinguish this case from the others from Nigeria. We yet have no reason to consider that our cases infected in Nigeria, four at least infected on the Benue River, are clinically different or milder than those from other parts of West Africa, and one would be disposed to consider that they were the ordinary infection with *T. gambiense*, but that is the only one in which lower animals were infected: the small forms supposed to be the characteristic of *T. nigeriense* were found in rats. . . . Nothing yet has been noted in cases from Nigeria that could, on clinical grounds, render any separation justifiable.”

Dr. Daniels has been well satisfied with prolonged use of atoxyl or soamin in doses of 3 to 4 gr. on alternate days. He gives antimony at the same time. The preparation he uses is antilueticin, which can usually be taken in half to one grain doses daily without objectionable symptoms. We are still, he writes, in want of a satisfactory antimonial preparation.

A. G. B.



CASES INFECTED WITH *T. GAMBIENSE*.

## I. H. K. The type case died in Liverpool after, probably, 14 years' illness.

	Probable date of onset of symptoms.	Trypanosomes found.	Ocular changes noted.	Latest Reports.	Result.	Duration of illness, Years.
2. Mrs. M.	1900-1901.	July, 1902.	Both eyes—the 2nd. stage at the end of fourteen years.	Fair health.	Recovery.	14
3. Mrs. S.	1901.	Oct., 1902.	Nil.	—	Death S.S. Nov., 1903.	2½
4. J. M.	June, 1902.	March, 1903.	Nil.	—	Death S.S. 1906.	4
5. Mrs. G.	—	1902.	—	—	Recovery.	12
6. Z.	June, 1903.	July, 1905.	Choroiditis.	Fair health.	Recovery.	10
7. Mrs. R.	— 1905.	Sept., 1905.	Nil.	Fair health.	Recovery.	10
8. H. C. S.	—	Feb., 1906.	Nil.	Fair health.	Recovery.	10
9. E. J. G.	Dec., 1907.	June, 1908.	Iridocyclitis 1909 (?) specific.	—	Death, Nov. 3, 1910.	10
10. C. G.	Nov., 1906.	Jan., 1907.	Nil.	Fair health.	Recovery.	10
11. C. V.	July, 1909.	June, 1910.	Nil.	Fair health.	Recovery.	6
12. A. P.	July, 1907.	July, 1907.	Nil.	Fair health (no recent information.)	Recovery.	9
13. Dr. McD.	Dec., 1909.	Dec., 1909.	Nil.	Fair health.	Recovery.	5½
14. S. S. W.	Sept., 1914.	Oct., 1914.	Nil.	Fair health, but trypanosomes were present recently.	—	—
15. A. S.	March, 1915.	March, 1915.	Nil.	Fair health.	—	—
RHODESIAN CASES.						
16. W. G.	Sept., 1909.	Oct., 1909.	Nil.	—	Died Dec., 1912, convulsions.	3
17. H. R. T.	March, 1912.	July, 1912.	Iritis.	—	Died Aug., 1912, catarrh of fundus.	6
18. A. C. E.	April, 1912.	May, 1912.	Iritis.	—	Died Sept. 1912.	6
19. H. N. McC.	Oct., 1913.	—	Iritis.	—	Died July, 1914.	1½
20. Lewis.	—	—	—	—	—	—
21. G. N. E.	Dec., 1913.	—	Iritis.	—	Died June, 1914.	4½
NIGERIAN CASES.						
22. W. R. E. (old 9).	Sept., 1906.	Jan., 1907.	Nil.	—	Died March, 1908, pneumonia.	1½
23. D. H. L.	Aug., 1908.	(?) Aug., 1909.	Nil.	—	Died 1911.	2½
24. C. W. B.	July, 1910.	July, 1911.	Nil.	—	Died March, 1914, septicaemia.	3½
25. W. H. S.	Aug., 1913.	Jan., 1914.	Iritis.	—	1914 (?) para.	1½
26. E. C. S.	July, 1913.	Feb., 1914.	Iritis.	—	Good health.	1½
27. P. A. A.	Sept., 1913.	Dec., 1914.	Iritis.	—	Fair health.	1½
28. Dr. J. W. T.	Oct., 1914.	Nov., 1914.	Nil.	—	Fair health.	6
29. W.	Oct., 1914.	Nov., 1914.	Nil.	—	Fair health.	½





SARTORY (A.), LASSEUR (Ph.) & BRISSAUD (H.). *Un cas de trypanosomiase chez un homme ayant quitté l'Afrique depuis huit ans.*—*Bull. Acad. Med.* 1915. May 31. 3e ser. Vol. 73. 79 année. No. 21. pp. 631-633.

In 1895, at the age of 21, the patient was sent to Algeria to do his military service. He was twelve years in that country, of which two and a half years were spent at El Golea in the south, and took part in the Timimounn expedition. He was often associated with black troops. He was never ill. On the return from El Golea he had three attacks of intermittent fever, of rapid onset, lasting only two or three hours with fever, shivering, and profuse perspiration, the latter not being a feature of the later illness. In 1907 he returned finally to France and resided at Tarbes (Hautes Pyrénées) and then Dijon. In 1911 he retired and lived at Tarbes till the mobilisation in 1914. In 13 years' married life his wife had never seen him ill.

In August 1914 he went to the Nancy front, where he was not in contact with black troops. In December he was seized suddenly with a prolonged rigor, intense headache and fever, and entered hospital three days later. His arms and legs were then the seat of nodosities and erythematous thickenings like those seen in multiform erythema. The elbows and ankles were painful and tender to pressure. The spleen was normal; slight enlargement of cervical lymphatics; no tremors. Twenty days later the joint pains and erythema had disappeared. He had had four sharp rises of temperature separated by three days apyrexia. There was intense headache, chiefly frontal and supra-orbital. These symptoms persisted till three weeks later others were noted—apathy, torpor, mutism, headache, great emaciation, deep-seated headache, asthenia; the liver became enlarged. Six weeks after admission his state was serious; his mind was clouded, the respiration of Cheyne-Stokes character. Three days later a trypanosome was found in the blood. A series of injections of neosalvarsan was given. A fortnight later his condition was greatly improved and in April he rejoined the army.

The authors believe the trypanosome to be *T. gambiense* and will later give information as to its characters.

[There is no evidence that this patient ever visited a tsetse fly area; Timimounn appears to be at 29° N. The long period of apparent good health between the quitting of Africa and the onset of the illness, as well as the character of this, rather suggests that he became infected in France, though there is no instance known of infection contracted outside Africa except in a laboratory. One is reminded also of the cases described by NEPVEU (1891 and 1898) from Algeria, which are generally discredited\*.]

A. G. B.

\*[NEPVEU studied a hundred and fifty malarial patients at Douéra, a few miles from Algiers, in 1888 and 1890. In a paper published in 1891 he describes the "Blood parasites" met with in them, which he classifies as "algues inférieures et schizomycètes" and "infusoires flagellés et sporozoaires." Thirty-four objects are figured. In 1898, referring to this study, he says that trypanosomes were found in six of over 200 patients, most of them with malaria; in one instance there were two flagella at one extremity of the organism. Had these bodies been trypanosomes, it is hardly credible that they should not have been met with in the last twenty-five years, during the latter half at least, of which so much attention has been given to blood examination.]

AUBERT (P.). *Sur deux cas de Trypanosomiase observée chez des Européens au Congo Français.*—*Bull. Soc. Path. Exot.* 1915. June. Vol. 8. No. 6. pp. 372-377.

As a rule sleeping sickness in Europeans can be diagnosed without difficulty. Between 1906 and the present time this disease has been recognized in 67 Europeans at Brazzaville; of these 65 had clinical symptoms which could hardly be misinterpreted, and the diagnosis was confirmed by the discovery of trypanosomes. In this paper there is given an account of the two cases in which a firm diagnosis was difficult.

*Observation 1.* Doctor B., who was attached to the Pasteur Institute at Brazzaville, reached the colony in January 1913. In September he complained of great lassitude and examined his blood several times; no parasites were found, but there was marked autoagglutination. The blood was centrifuged on two occasions without trypanosomes being found. He then received about forty injections of cacodylate of soda and by the 30th September felt fit again. In December the blood was centrifuged again but nothing found. In February 1914 the lassitude reappeared and was extreme; there was loss of weight and tachycardia. February 12th to 22nd, there was headache and nausea and rise of temperature in the evening. February 22nd some enlarged but not puncturable cervical glands were found, and Kerandel's sign was noted on the inner ankles; a clinical diagnosis of trypanosomiasis was made. On the 23rd the blood was centrifuged without result and 30 cgm. atoxyl was injected; all symptoms disappeared except Kerandel's sign. 28th, reappearance of the symptoms. March 2nd, fresh injection of atoxyl, 50 cgm.; three hours later there was a violent chill with rise of temperature. On the 10th the blood was centrifuged again and numerous trypanosomes were found.

*Observation 2.* D. entered the Colonial Service in 1903. His fourth tour of service in French West Africa lasted from October 1910 to January 1913. At the end of 1910, shortly after a canoe journey on the Ogowe river, a small violet coloured swelling was noticed between the extensor tendons of the thumb. Some time afterwards two glands were noticed, one under the jaw, the other above the clavicle. Gland puncture was done with a negative result. The patient received some injections of arrhenal and did not return to France till January 1913. There he had generalised pruritis and, later, a spotty eruption on his skin. His fifth tour was from July 1912 to May 1914. In January 1914 he had fever for three days, the cervical glands increased in size. May 1914, rare trypanosomes were found in the blood as well as in the gland juice. The patient was sent to Libreville, where repeated examinations of his blood (with and without centrifugation) and gland juice were negative. From June to September 1914 he was under observation at Brazzaville; his only symptoms at that time were enlarged cervical glands and some rose coloured spots on the left leg. No trypanosomes could be found in the glands or blood with or without centrifugation. In June 1914 a patas monkey was inoculated and, this failing to become infected, in August a second. Ten days later rare trypanosomes were found in the first patas. Some of its blood was inoculated into a young baboon, which showed trypanosomes at intervals for two months. The other patas monkey was not infected 130 days later.

The author remarks that Dr. B.'s infection was due to accidental contamination in the laboratory, probably owing to the deposit of virulent fluids on skin presenting slight lesions. There was no local reaction where the virus entered. He thinks that Kerandel's sign has great value in diagnosis; it has rarely failed to appear in the European cases he has seen. The rarity of parasites in the circulating blood of each patient he attributes to the arsenical treatment. With

regard to the sensitiveness of *Cercopithecus patas* he notes that though one of these animals served to clinch the diagnosis, the other failed to become infected. The injection of atoxyl into healthy persons does not cause any rise of temperature; hence the value of the "test reaction with atoxyl," which gave the required information in the case of B. It is noted that the trypanosomes became very numerous after the second injection, which was a small one; this seems to show that it is preferable to give large doses at the beginning of treatment. With regard to the infection of the baboon, baboons being almost refractory to *T. gambiense*, the question is asked whether this was a *gambiense* infection. The virus has been sent to MESNIL with a view to its determination.

A. G. B.

**TUTTLE (Howard K.). African Trypanosomiasis. Report of a Case.**  
—*Jl. Amer. Med. Assoc.* 1915. July 17. Vol. 65 No. 3.  
pp. 240-241.

The case was that of a negro who was admitted to the Massachusetts State Infirmary in October 1914. Two years before he had left his native place, the Cape Verde Islands, for Portuguese Guinea where he remained a year and a half. He landed in the United States in April 1914. He was at a late stage of the disease with marked weakness and somnolence. Trypanosomes were found after centrifugation of 30 cc. of spinal fluid. Death occurred in January 1915. Had a Portuguese interpreter not been available, the author says, the case would have been diagnosed as general paralysis, cerebrospinal syphilis or pellagra.

A. G. B.

**YORKE (Warrington) & BLACKLOCK (B.). Notes on the Bionomics of *Glossina palpalis* in Sierra Leone, with Special Reference to its Pupal Habitats.** [Being the First Report of the Thirty-second Expedition of the Liverpool School of Tropical Medicine, 1914-1915.]—*Ann. Trop. Med. & Parasit.* 1915. July 31. Vol. 9. No. 3. pp. 349-362. With 7 plates & a map.

The scene of the researches detailed in this paper was the Cape Lighthouse Peninsula, at the mouth of the Sierra Leone river, shown on a large scale map. This is a triangular piece of ground bounded by Aberdeen Creek on one side and by the sea on the two others and attached by a long narrow neck of land. Its area is about three quarters of a square mile. There is a dense growth of mangroves on the Creek side. Oil palms are found all over the peninsula, in certain places exclusively, the dense undergrowth being formed by young palms. There are between five and six hundred inhabitants and four hundred more at the junction with the mainland. *G. palpalis* was present in fair numbers in December and January and there the authors decided to study its bionomics.

They commenced with a search for pupae, and in the first place examined, the hollow trunk of a baobab tree (photograph), eighteen empty puparia were found. The tree was at least 100 yards from the sea and a quarter of a mile from the nearest fresh water. Other likely places were searched with little success and the authors decided

to examine the oil palms. It is difficult to approach the trunk of an oil palm which has its lower petioles still unremoved; these are spiny, stick out horizontally, and form an impenetrable barrier. A tree was chosen at random and the petioles one by one cut off. Twenty pupal shells were then found beneath. They lay in dense shade not only of this palm but of surrounding ones. The search was facilitated by the use of a newspaper on which the debris was placed by shovelfulls. Other palms were then examined in a similar way and from ten to seventy-five puparia were found in each of such situations. The majority were on or close to the surface. Of twenty palms examined consecutively pupae were found beneath all but two. Though careful search was made, they found but one specimen in the angles which the petioles make with the trunk though these were filled with debris and appeared to be suitable. Out of a total of 450 puparia only twenty were unhatched.

It is popularly supposed that there is some connection between mangrove swamps and *G. palpalis*, which is locally known as the mangrove fly. The mangroves were therefore carefully examined both at high and low water. The fly was found as far as the outermost fringe, at least half a mile from dry land. The mangroves afford fairly good shade and paths are cut through them to the fishing grounds beyond. A careful search was made for pupae in the sandy mud among the mangroves and on the trees themselves; none were found and it is noted that the mangroves afford very few places for the lodgement of pupae. Immediately above high water mark pupae were found in numbers below oil palms. An experiment performed by the authors tends to show that pupae deposited on ground covered by sea water for a portion of each day would not hatch.

The authors note that fly and pupae are distributed evenly over the peninsula and are not limited to the neighbourhood of water as in Uganda, and that there are no previous records of pupae being found except "on the water's edge." [The greatest distance recorded hitherto appears to be 45 yards from water.] By far the majority of the puparia found were within one foot of a tree trunk. The authors are convinced that it is the presence of the lower petioles that renders young oil palms such excellent breeding places. They suggest that the removal of these would destroy the breeding grounds and not damage the trees; in old palms the lower petioles are absent. They advocate such an experiment on this peninsula. Their conclusions are as follows:—

"1. The breeding grounds of *Glossina palpalis* are not so strictly limited to the immediate vicinity of water as has hitherto been thought; they may occur quite independently of fresh water and at least a quarter of a mile from sea water.

"2. Although *Glossina palpalis* is to be found in considerable numbers in mangrove swamps and may travel in these to a distance of at least half a mile from dry land, the swamps do not constitute a breeding ground of the fly.

"3. The pupae of *Glossina palpalis* do not hatch when subjected to daily flotation on sea water.

"4. The ground around the trunk of oil palms (*Eloeis guineensis*) which have not been stripped of their lower petioles constitutes an excellent breeding place for *Glossina palpalis*.

"5. *Glossina palpalis* can breed in localities in which practically the only tree is the oil palm.

"6. Stripping the oil palm of the lower petioles would suffice to destroy the breeding ground in such localities."

Photographs of oil palms and of mangrove swamp illustrate the report.

[In 1909 the reviewer reported the finding in 1907 of 31 pupae under the wild date palm in Uganda.\* Attention was drawn to this in the *Sleeping Sickness Bulletin*. "In one instance [pupae] were obtained about the base of a palm, and this is probably a common situation in regions where palms are of frequent occurrence." (Vol. 1, p. 91.) Again in Vol. 1, p. 401, apropos of the finding of pupae by ZUPITZA in the leaf sheaths of oil palms :—"Seeing that this plant is extensively cultivated on the West Coast of Africa its real importance as a breeding ground of *palpalis* should be ascertained. The pupae might be found between the old leaf sheaths and the stem or amongst the debris of fronds on the ground." Stripping of the old leaf bases was suggested by ZUPITZA. The subject was again referred to in Vol. 2, pp. 45 and 109. It is curious that confirmation of these observations and suggestions has been so long deferred.]

A. G. B.

YORKE (Warrington) & BLACKLOCK (B.). *Food of Glossina palpalis* in the Cape Lighthouse Peninsula, Sierra Leone. [Being the Second Report of the Thirty-second Expedition of the Liverpool School of Tropical Medicine, 1914-1915.]-*Ann. Trop. Med. & Parasit.* 1915. July 31. Vol. 9. No. 3. pp. 363-380.

Practically all the recorded observations indicate that for the continued existence of *G. palpalis* vertebrate blood is necessary. The authors dissected 200 flies in the manner described by LLOYD [*Sleeping Sickness Bulletin*, Vol. 4, p. 235]. The gut contents were examined fresh between a slide and coverslip. Recognisable red blood corpuscles were seen in 16, in 14 cases mammalian and in 2 non-mammalian. The mammalian red cells were of the large type and not the small variety found in sheep and goats. The authors say that the source of nucleated blood corpuscles on this peninsula is apparently much larger than that of non-nucleated, but it is stated that no flies were captured more than a quarter of a mile from human habitation. To obtain data of the length of time red blood cells can be recognised in a tsetse, freshly caught flies were fed on rat and fowl and dissected at varying intervals. The results are given in tables.

As to the question whether tsetse fly take up other food than blood, STUHLMANN, DEGEN and TAUTE are quoted in the negative sense, MAUGHAM and CARPENTER in the positive, the latter as affording good evidence. The rest of the paper is an outcome of the work done by RODHAIN and his collaborators, using vessels covered with rat skin [see this *Bulletin*, Vol. 1, p. 124, and Vol. 2, p. 571]. An experiment in which fluids stained with neutral red or methylene blue were submitted in Petri dishes to hungry flies was negative, a conclusive result

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\*Observations relating to the Transmission of Sleeping Sickness in Uganda; the Distribution and Bionomics of *Glossina Palpalis*; and to Clearing Measures. By Aubrey D. P. HODGES, M.D., Lond., 1909. London: Sleeping Sickness Bureau, p. 18.

as these dyes stain the tissues deeply if taken up. In the other experiments a membrane was employed.

"The apparatus used by us was a slight modification of that figured and described by Rodhain. It consisted of a short glass cylinder about three-quarters of an inch in diameter, the lower end of which was closed by a cork through which the shorter limb of a U-shaped piece of glass tubing passed; the upper end of the cylinder was covered by the membrane. The pressure of the fluid in the cylinder was indicated by its level in the longer limb of the glass tube."

Flies were first fed through fresh rat's skin on defibrinated blood, on which they gorged themselves completely whether the blood pressure was positive or negative. The blood was then diluted with salt solution and 50, 25 and 10 per cent. solutions were equally well taken, but 5 per cent. less well. Fresh defibrinated goat blood was now centrifuged, the red cells were separated from the plasma and a 50 per cent. suspension made in salt solution—a concentration approximate to that found in blood. *G. palpalis* engorged itself readily on this and on dilutions thereof down to 10 per cent. Fresh defibrinated plasma was well taken by two only out of eight. It was concluded that the attractive part of the blood is the red corpuscle. Washed red cells were now laked; three *palpalis* quickly engorged themselves upon the solution. An attempt was made to separate the stromata from the soluble portion of the corpuscle, without complete success owing to want of suitable apparatus; the solution was well taken and a solution made from the crystalline haemoglobin of commerce was taken to some extent.

Various other solutions, in each case coloured with methylene blue, neutral red or fuchsin, were now offered to *G. palpalis* through a skin membrane, e.g. physiological saline, sugar solution, glycerin. All were taken up to some extent, as evidenced by the staining. Three flies became completely engorged with 0.9 per cent. sodium chloride solution to which had been added about 5 per cent. of cane sugar and a little neutral red. It was found that the fly would feed through sheep's bladder and peritoneal tissue and would plunge the proboscis through and, rarely, imbibe fluid through a thin sheet of rubber; perhaps this tended to occlude the lumen of the proboscis.

These experiments show that under favourable conditions *Glossina* will take up solutions of vegetable origin, such as sugar and water, provided that the fluid is enclosed in a membrane. The physical character of the fluid does not, within limits, appear to matter. Does *Glossina* take up vegetable juices in nature? The authors had no opportunity of deciding the point. They noticed that *palpalis* will pierce leaves placed on the surface of a liquid.

#### Conclusions :—

"1. About eight per cent. of the wild *G. palpalis* in this district contain recognisable red blood cells—seven per cent. of mammalian origin and one per cent. nucleated red cells of unknown origin.

"2. Seventy-two hours after *G. palpalis* had completely distended itself on rat's blood recognisable red cells could no longer be found in its intestine; after being fed on a fowl nucleated red blood cells could be recognised in 40 per cent. of cases at the end of a similar period. The flies were kept at a temperature of 80°–86° F.

"3. Neither shed blood nor other fluid which is exposed (not covered by a membrane) can be imbibed by *G. palpalis*.

"4. *G. palpalis* can take up through a membrane of fresh skin not only blood and various dilutions of it with normal saline, but also suspensions of red blood cells in normal saline, and solutions of haemoglobin (both freshly made from red blood cells, and the dried crystalline preparation of commerce) in distilled water.

"5. Fluids other than blood such as solutions of sugar, sodium chloride, and glycerine, in water containing a small quantity of a dye (methylene blue, neutral red or fuchsin) are also taken up through a membrane of fresh skin by *G. palpalis*, but not so quickly or so readily as is blood.

"6. *G. palpalis* exhibits a definite selective taste for the various fluids presented to it under the membrane; blood, red cells, and haemoglobin solution being much preferred. The attractive element in the blood is the fraction of the red cells soluble in water, probably haemoglobin.

"7. *G. palpalis* which had been starved for a day or two can often be seen to insert the proboscis repeatedly into oranges, bananas or other fruits which may be offered them.

"8. We are of opinion that *G. palpalis* in nature may under certain conditions take up fluid other than blood."

A. G. B.

BEQUAERT (J.). *Notes sur la dispersion des Glossines au Congo belge.*

—*Bull. Soc. Path. Exot.* 1915. July. Vol. 8. No. 7. pp. 463–467.

The notes recorded in this paper were made during a recent journey in the eastern part of the basin of the Congo. They chiefly concern *Glossina palpalis*. On board a Congo steamer the author saw a small jumping spider (*Dolomedes* sp. ?) which had captured a tsetse. On one of the islands in the river he saw a dragon fly resting on the sand holding a *palpalis* between its mandibles; he notes that this observation had previously been made by CARPENTER in Uganda. He found *Glossina palpalis* to the south of the Albert Edward Lake, but never at a height above 1,200 to 1,250 metres. He notes that ROUBAUD has recently reported from the collections of the Paris Museum several specimens of *G. palpalis* var. *fuscipes* supposed to have been collected by CRONIER in the volcanoes of Kivu between 1,500 and 3,000 metres. He questions whether this is correct and suggests that it is due to an error of labelling. He does not think that *palpalis* exists on the banks of Lake Kivu, which is 1,460 metres. He notes that in his experience, as in that of others, in places frequented by man males and females of *palpalis* are caught in approximately equal number, whereas males predominate in catches in uninhabited places, and gives figures in support of this.

In the discussion which followed, ROUBAUD did not accept the author's view as to the Kivu specimens. He thought that one should be very cautious in affirming the absence of *palpalis* owing to its large seasonal migrations. He had noted that at one inhabited area which he examined females were much more numerous than males in August, whereas the relation was reversed in October, which is against Bequaert's generalisation.

A. G. B.

YORKE (Warrington) & BLACKLOCK (B.). *Notes on Certain Animal Parasites of Domestic Stock in Sierra Leone.* [Being the Fourth Report of the Thirty-second Expedition of the Liverpool School of Tropical Medicine, 1914–15].—*Ann. Trop. Med. & Parasit.* 1915. July 31. Vol. 9. No. 3. pp. 413–420.

A serious outbreak among cattle having occurred, the authors proceeded to Batkanu to investigate it. The cattle had been brought



originally from French Senegal, and were nearly all bullocks. The disease appeared towards the end of the rainy season when *Stomoxys nigra* was plentiful. The authors did not see the animals until the epizootic had ceased. Trypanosomes and piroplasmata were found in their blood, and in the blood of other domestic animals in Sierra Leone.

Trypanosomes were found in 19 cattle out of a total of 143. Some of these were examined in Freetown. In the infected animals, *T. congolense* was found 11 times, *T. vivax* twice, a double infection of *T. congolense* and *T. vivax* five times, and *T. gambiense* once.

A rat sub-inoculated from a dog showed *T. congolense* in its blood, though the parasite was not seen in the dog.

Four hundred wild *Glossina palpalis*, caught on Cape Lighthouse Peninsula, were dissected; trypanosomes were found in 21 of them. The salivary glands of the Glossinae were not parasitised, only the proboscis in 15 cases and the gut in two, while both gut and proboscis were found to be parasitised in 4 cases.

*Piroplasma bigeminum* occurred in about 5 per cent. of the cattle examined. *Theileria mutans* occurred in 20 to 30 per cent. of the cattle; the parasites did not appear to produce any symptoms of disease. Koch's "blue bodies" were not found.

Ticks collected from 90 cattle at Batkanu were *Boophilus australis* and *Amblyomma variegatum*, the former being the most numerous.

The authors' conclusions are :—

"1. Cattle are not bred to any extent in the Colony of Sierra Leone or in most parts of the Protectorate. Bullocks are, however, imported from French Senegal in considerable numbers, and gradually find their way down to Freetown for slaughter.

"2. Serious outbreaks of disease in the form of epidemics occur amongst the cattle of Sierra Leone.

"3. These epidemics have been attributed to various causes, but their real nature is still obscure.

"4. Trypanosomiasis of cattle is common. Of the thirty-four animals examined at the slaughter-house in Freetown, fourteen (41 per cent.) were found to be infected. As only a single blood film was examined, the real percentage of infections is certainly much higher.

"5. *T. congolense* and *T. vivax* are the parasites most commonly found. *T. gambiense* was met with once.

"6. About 5 per cent. of the animals examined were found to be infected with *Piroplasma bigeminum*.

"7. *Theileria mutans* was encountered in between 20 and 30 per cent. of the cattle examined."

H. B. Fantham.

SERGEANT (Edm.), LHÉRITIER (A.) & BELLEVAL (G.). *Sur le Trypanosoma maroccanum*, n. sp., agent d'une épizootie équine à Casablanca en 1911.—*Bull. Soc. Path. Exot.* 1915. July. Vol. 8. No. 7. pp. 433-438.

In the year 1911 one of the authors noticed this disease amongst horses at Casablanca, Morocco. A trypanosome was found in the blood. The systematic study of the virus was begun in 1912 and is only lately concluded. In the interim VELU has reported trypanosomiasis amongst horses in the district of Fez [see this *Bulletin*, Vol. 5, p. 414]. The clinical accounts of the disease have unfortunately been lost. The trypanosome as seen in the blood of guinea-pigs is

18 $\mu$  long (maximum 24, minimum 16 $\mu$  (and 1.5 to 2.5 $\mu$  broad. The results of a few animal inoculations are given. It is concluded that the morphological and experimental study of this trypanosome does not show any difference between it and the most wide-spread trypanosome of North Africa—*Trypanosoma berberum*, the cause of debab.

They went on to experiments of crossed immunity with this trypanosome, *T. berberum*, *T. equiperdum*, and *T. soudanense*. These are detailed. They showed in the first place that the Casablanca virus differs from that of debab and the Sudanese Tahaga; a camel and two goats immunised towards *T. berberum* and *T. soudanense* contracted the Casablanca virus. On the other hand, a goat immunised against the Casablanca virus became infected with *T. berberum*. They showed also that the Casablanca virus differs from that of dourine; for a camel and a goat immunised towards the Casablanca virus became infected with *T. equiperdum*. This trypanosome therefore is regarded as a new species, for which the name *T. marocanum* is proposed.

A. G. B.

FIORI (C.) & DELANOË (M. et Mme.). Sur un cas de trypanosomiase constaté chez un cheval à Mazagan. Note préliminaire.—*Bull. Soc. Path. Exot.* 1915. July. Vol. 8. No. 7. pp. 503-515. With 1 chart & 1 plate.

The horse in question was received into the veterinary infirmary at Mazagan, Morocco, in February 1915. It is believed to have contracted its infection at Mazagan. A detailed account is given of the physical signs and symptoms, illustrated by a chart. Trypanosomes were seen on four different occasions during April and May. Inoculations were made into white rats, white mice, dogs, rabbits and a sheep. These experiments are summed up in a table.

The trypanosome is described in the fresh state and stained by Pappenheim's process. A plate shows trypanosomes in the horse's blood and in the blood of a dog and a rat. It is noted that posterior nuclei were never seen. Seven per cent. of the parasites in smears of the horse's blood had no free flagellum; the trypanosome therefore is regarded as dimorphic, but it is said that the dimorphism is much less marked than that met with in *T. pecaudi* Laveran. Various measurements of 52 trypanosomes are given in a table. The average length was 26.3 $\mu$  (minimum 16.8, maximum 33.5 $\mu$ ). The free flagellum averaged 4.6 $\mu$ . The average width of the trypanosome was 3.2 $\mu$ . Another table shows the measurements of 36 trypanosomes from the blood of the rat. It is seen that they are longer in this animal, the average length being 31 $\mu$ . Trypanosomes without free flagellum were met with, but in much less numbers. It is stated that they tend to become monomorphic in the rat even at the first passage and it is suggested that in successive passages those without free flagellum might disappear completely. In the rat a certain proportion of trypanosomes had no blepharoplasts, about 16.5 per cent.

The authors ask whether this trypanosome is that of debab, *T. soudanense*, var. *berbera*. The results of the animal inoculations would satisfy this diagnosis, but forms without free flagellum have not been reported in debab. They think that tests of crossed immunity are required to settle the diagnosis. They believe that the infection arose from the caravans of camels which come from Marrakesh.

A. G. B.

YAKIMOFF (W. L.). *A propos du Trypanosoma wrublewskyi*.—*Bull. Soc. Path. Exot.* 1915. July. Vol. 8. No. 7. pp. 431-433.

The author recalls that in 1907 WRUBLEWSKY discovered a flagellate in bison of Bielowiech, which was named by WLADIMIROFF and Yakimoff *Trypanosoma wrublewskyi*, n. sp. The opinion with regard to the specificity of this organism has now been changed for the following reasons:—The discoverer of the organism did not make smears at the time that the blood was taken, but took the blood in Pasteur pipettes, kept it for 7 to 9 days, and then made smears. The serum in the pipette was thus an excellent culture medium, and WRUBLEWSKY really had obtained preparations of the cultural forms of the trypanosome. The organisms resemble cultural forms of *T. theileri*, which are crithidial. As *T. theileri* is present in cattle in the north of Russia, and the bison can be infected with a cosmopolitan trypanosome like *T. theileri*, the author suppresses the name *T. wrublewskyi* in favour of *T. theileri*, which is considered to be non-pathogenic. H. B. F.

COLES (Alfred C.). *Multiplication-Forms of Trypanosoma lewisi in the Body of the Rat*.—*Parasitology*. 1915. Sept. 20. Vol. 8. No. 2. pp. 184-189. With 2 plates.

The trypanosome, *T. lewisi*, was examined in dead rats (*Mus decumanus*) obtained near Bournemouth during the last ten years. Coiled up trypanosomes were seen occasionally in smears of the lungs, also apparently encysted forms in the liver. The author then briefly describes what he calls "minute trypanosomes," which are really leishmaniform stages and were found in the lungs of three rats. [Compare the rounded, non-flagellate stages of other trypanosomes]. CARINI's pneumocysts were also found in the lungs [but the accompanying photomicrographs of these structures, unfortunately, are not very convincing]. Multiplication cysts of *T. lewisi* were found in the heart blood and lungs on two occasions; these cysts are spherical,  $14\mu$  to  $18\mu$  in diameter, and contain many nuclei and blepharoplasts. It is also claimed that "in the lung and heart blood of naturally infected rats many of the stages which MINCHIN and THOMSON (1915) have described and illustrated in their . . . . work on the stages of *T. lewisi* in the rat flea" were found.

Trypanosomes in actual binary fission were only seen in young rats. Crithidial forms were found in heart and lung blood. The paper is illustrated by 34 small photomicrographs.

[Most of the stages of *T. lewisi* recorded by the author were described and figured by MOORE, BREINL and HINDLE in 1908 in the *Annals of Tropical Medicine and Parasitology*, Vol. 2, pp. 197-220, 4 plates.]

H. B. F.

HOFFMANN (George L.). *Chemotherapeutische Studien über die intravenöse Verwendung von Antimontrioxyd bei experimentellen Trypanosomeninfektionen*. [The Intravenous Employment of Antimony Trioxide in Experimental Infections].—*Zeitschr. f. Hyg. u. Infektionskr.* 1915. Aug. 18. Vol. 80. No. 2. pp. 261-279.

The author gives an historical account of the use of antimony and its salts in trypanosome infections down to the work of KOLLÉ,

HARTOCH, ROTHERMUNDT and SCHUERMANN [this *Bulletin*, Vol. 2, pp. 134 and 351; Vol. 3, p. 247], who first employed the trioxide. They demonstrated that for an antimonial compound to be therapeutically effective the antimony must be in trivalent form. Whereas in all other substances tried toxicity increased with trypanocidal activity, the trioxide proved to be almost non-toxic for laboratory animals. They gave it by intramuscular injection to small animals, intravenously in very fine suspension to larger laboratory animals, with success. YORKE and BLACKLOCK have reported on their trial of the drug [*loc. cit.* Vol. 3, p. 532]. They used it intramuscularly and intravenously; in the latter form it tended to deposit from the saline solution in which it was suspended.

The author tried to improve the means of suspension. He used rabbits infected with nagana and dourine, and did not intervene till clinical signs were marked. The suspending media were sugar solutions, gum arabic solutions, and mixtures of these. Best was a 7.5 per cent. solution of gum arabic in the *Syrupus simplex* of the Swiss Pharmacopoeia.

The technique of making the suspension is described. It proved more toxic than that used by KOLLE and his co-workers. The protocols follow. Five rabbits had a single injection from a fortnight to six weeks after inoculation with nagana; their blood was tested once a month by inoculation into mice and was negative three to four months later. The dose, 45 mgm. per kilo body weight, was less than that employed by KOLLE. Similar results were obtained in eight rabbits infected with dourine. The chemotherapeutic index, that is, relation of therapeutic to toxic dose, was in each case very low.

The author concludes that antimony trioxide given intravenously to rabbits infected with nagana and dourine brings about *Therapia sterilisans magna*; that sugar and gum arabic solutions are most suitable for suspending the drug; and that the views of KOLLE and others on the value of antimony trioxide as a curative agent are fully supported by these experiments.

A. G. B.

NUTTALL (G. H. F.) & HINDLE (E.). Experiments in the "Tryposafrol" Treatment of Trypanosomiasis (*T. brucei*) in Guinea-pigs and of Piroplasmosis in Dogs.—*Parasitology*. 1915. Sept. 20. Vol. 8. No. 2. pp. 218-228.

The authors refer to the reports upon experiments with this drug by BRIEGER and KRAUSE [*Sleeping Sickness Bulletin*, Vol. 4, pp. 60 and 328]; they claimed to cure nagana in rats and guinea-pigs. These claims however were not substantiated by RIETZ and LEUPOLD, and in sleeping sickness no good results have been obtained (LURZ; WERNER; MOUCHET and DUBOIS). Later BRIEGER and KRAUSE stated that excellent results had been obtained in various other diseases, in such a way as to challenge criticism. The authors therefore undertook experiments with tryposafrol and novo-tryposafrol on guinea-pigs infected with *T. brucei* (strain "ferox"). There were 19 treated and 6 untreated controls. The results showed that "the two preparations of the dye were worse than useless as remedies for nagana in guinea-pigs." Similarly, novo-tryposafrol proved useless in the treatment of canine piroplasmosis.

A. G. B.

**KOLMER (John A.). A Method of transmitting Known Numbers of Trypanosomes with a Note on the Numeric Relation of Trypanosomes to Infection.**—*Jl. Infect. Dis.* 1915. July. Vol. 17. No. 1. pp. 79-94. With 1 text-fig.

"Briefly, the method consists in securing a definite volume of blood in a blood corpuscle-counting pipet, and mixing it with a definite amount of a diluting fluid that hemolyses the erythrocytes, and fixes and stains the trypanosomes. The trypanosomes are then counted by means of a Thoma-Zeiss counting chamber and the number in a cubic centimeter of undiluted blood calculated. With this data at hand, 0.1 cc. of blood is drawn aseptically from the heart of the seed animal in 0.9 cc. of a 10 per cent. solution of sodium citrate in normal salt solution. With this blood, dilutions are made in warm, sterile, normal salt solution until a cubic centimeter or a fraction thereof contains the required dilution and number of trypanosomes determined upon for the purpose of infecting a series of rats, or for any other purpose."

The diluting fluid is :—

Formalin (40 per cent.)	..	..	..	2 cc.
Glacial acetic acid	..	..	..	2 cc.
Distilled water	..	..	..	96 cc.

Mix and add 2 cc. carbolfuchsin (Ziehl-Neelson); mix again and filter through paper.

*Trypanosoma lewisi*, *T. equiperdum* and *T. brucei* were used, and full protocols are given.

The conclusions are :—

"A method is described which has been found simple, fairly accurate, and very useful for transmitting approximately known numbers of trypanosomes to normal rats under sterile conditions and without injury to the seed animal.

"By this method, several series of rats have been infected with increasing numbers of *Trypanosoma lewisi*, *T. equiperdum*, and *T. brucei*, and a study made of the minimal number of trypanosomes in each species necessary for infection, as well as the time of true incubation and duration of life. Well-defined quantitative relations were found with *T. brucei*, less with *T. equiperdum*, and least with *T. lewisi*.

"The injection of small numbers of pathogenic trypanosomes lengthens the period of incubation and, in this manner, the duration of life, as dating from the time of infection; but when the parasites once appear in the peripheral blood, the duration of life is about the same, regardless of whether the animal was originally infected with a large or a small number."

H. B. F.

**WOLBACH (S. B.), CHAPMAN (W. H.) & STEVENS (H. W.). Concerning the Filterability of Trypanosomes.**—*Jl. Med. Research.* 1915. Sept. Vol. 33. No. 1. pp. 107-117.

It is recalled that NOVY and MACNEAL in 1906 reported that in cultures of *Trypanosoma lewisi* the smallest forms which developed would pass through Berkefeld filters. BRUCE and BATEMAN (1908), testing this possibility with regard to *T. brucei* and *T. evansi*, obtained negative results. Further, in 1911 BRUCE and colleagues found that there were no filterable stages of *T. gambiense* in *Glossina palpalis*.

The authors' experiments were begun and abandoned in 1912, the results being negative. They were resumed, however, in 1915, when it was confirmed that *Spirochaeta duttoni* would pass through Berkefeld filters.

Twenty-four experiments were made, six with the blood and organ juices of animals infected with *T. brucei*, two with *T. gambiense*, and the remainder with *T. lewisi*. In the case of the last-mentioned trypanosome, cultures were sometimes used, the cultures being grown on a modified Novy-MacNeal-Nicolle medium, to which veal infusion and dextrose had been added. The blood or ground-up organs were first filtered through a Büchner filter to remove shreds of tissue and a part of the blood corpuscles. A control bacterium (e.g., *Bacillus prodigiosus*) was added to the Büchner filtrate.

Protocols of the 24 experiments are given. The results were negative. The authors conclude that "trypanosomes from cultures and from animal tissues are not filterable through bacteria-proof filters."

H. B. F.

LAVERAN (A.). *Au sujet d'un Trypanosoma gambiense qui, conservé depuis 12 ans chez des animaux, est resté résistant au sérum humain.*—*Bull. Soc. Path. Exot.* 1915. July. Vol. 8. No. 7. pp 442-446.

The author showed in 1904 that normal human serum that was active both preventively and curatively on the viruses of animal trypanosomiasis was without action on *T. gambiense*. Later he found that a strain kept in his laboratory for nine years had not become susceptible. MESNIL and RINGENBACH however have shown that a strain of *T. gambiense* maintained in the laboratory for seven years evinced a certain susceptibility [*Sleeping Sickness Bulletin*, Vol. 4, p. 279; this *Bulletin*, Vol. 5, p. 97]. Hence the fresh experiments with Laveran's strain, which had been kept up almost exclusively in guinea-pigs.

Four guinea-pigs were inoculated with virulent blood mixed with half or one cubic centimeter of human serum; two controls received the blood inoculations only. All the four became infected; two behaved like the controls as regards the incubation period and duration of infection; in one case there was a delay in the appearance of trypanosomes and a longer duration of the disease; in the fourth case the disease lasted very long (still in progress), but Laveran notes that recent infections with this virus have dragged on a long time (nine months in one case).

The experiments show that the sero-resistance of *T. gambiense* has changed very little at the end of twelve years, and demonstrate again that in this regard *T. gambiense* behaves quite differently to *T. rhodesiense*.

A. G. B.

LANFRANCHI (A.). *Sur le passage des Trypanosomes dans le lait.*—*Bull. Soc. Path. Exot.* 1915. July. Vol. 8. No. 7. pp. 438-442.

The researches of BRUCE and others have shown that many species of trypanosome can pass through healthy mucous membrane. The

author sought to ascertain if they can pass into the milk. He experimented with *T. brucei*, *T. evansi*, *T. rhodesiense* and *T. gambiense*, obtaining the strains from MESNIL. His object was to ascertain (a) if new-born animals fed at the breast would contract infection; (b) if it is possible to demonstrate trypanosomes by direct examination of the milk; (c) if the milk is infective when inoculated direct into the peritoneum of rats and mice. The experiments are described.

In the case of *T. gambiense*, seven puppies were born on the 23rd June and left at the breast. On the 24th the mother was inoculated and on the 30th showed a few trypanosomes, which on July 4th were numerous.

Results obtained : —

- (a) Three of the puppies died and their blood was infective to mice.
- (b) The microscopic examination of the milk was negative.
- (c) A mouse inoculated with milk on the 4th July showed trypanosomes nine days later.

Similar results were obtained with *T. brucei*. In the case of *T. rhodesiense* experiments (a) and (b) were negative; one animal became infected under (c). In the case of *T. evansi* all the results were negative.

It is noted that TERRY has shown that only half of the rats inoculated with nagana and other viruses by way of the stomach contracted infection. Lanfranchi anticipates the objection that there may have been slight lesions of the nipple so that the puppies were infected directly from the blood, by pointing out that that would not explain the results obtained under (c). He also notes that the milk was never infective during trypanolytic crises. He concludes by affirming that the passage into the milk of *T. brucei*, *T. rhodesiense* and *T. gambiense* is possible and animals infected with *T. brucei* and *T. gambiense* can infect their young by suckling them.

A. G. B.

WATSON (E. A.). Dourine and the Complement Fixation Test.—*Parasitology*. 1915. Sept. 20. Vol. 8. No. 2. pp. 156–183.

This paper is highly technical and its scope only can be indicated here. The author writes from an experience of 15,000 tests for dourine made at the Veterinary Research Laboratory, Lethbridge; the complement fixation reaction “has been thoroughly established as a sure, safe, and specific method of diagnosing dourine.” It has been adopted as the official test in Canada. Only by its application can healthy looking carriers of the disease be detected. Most of the paper deals with technique and procedure, under the headings Preparation of Reagents, Titration of Reagents, Serum to be tested. As to the test itself two alternative methods of procedure are advised according as one or several tests have to be made, or for daily routine testing on a large scale. The author then deals with certain objections to the employment of the test, which he meets.

“Experience indicates that 100 per cent. of dourine infected animals, whether in active or latent stages of disease, give positive serum reactions, provided that an interval of two to three months has been allowed for an incubation period in the more or less resistant animals, less than one month being sufficient in most cases.”

Comparing this test for dourine with the Wassermann test for syphilis the author says that the latter is greatly inferior whether in delicacy, specificity or trustworthiness. He adds that no one should attempt to apply the test who has not thoroughly mastered the technique and gained complete control of the reagents.

A. G. B.

i. NEIVA (Arthur). *Presença em uma localidade do Estado do Rio de um novo transmissor da "Molestia de Chagas" encontrado infectado em condições naturais.* (Nota prévia.) [Occurrence in a Locality in the State of Rio of a New Carrier of Chagas's Disease found Infected under Natural Conditions.]—*Brazil Med.* 1914. Sept. 15. Vol. 28. No. 35. pp. 333-335.

ii. *Contribuição para o conhecimento dos hemipteros hematophagos da America Central.* (Nota prévia.) [A Contribution to our Knowledge of the Blood-sucking Hemiptera of Central America.]—*Ibid.* 1915. Jan. 1. Vol. 29. No. 1. pp. 1-3.

i. The author announces the discovery of a new carrier for Chagas's disease in *Triatoma vitticeps* (Stal), a specimen of which was found naturally infected with *Trypanosoma cruzi* in the vicinity of Rio. The species in question is so large, being 35 millimetres in length by 15 in breadth, that it has not been suspected hitherto of being a blood-sucker of human beings. Practically nothing is known of the biology of this species of *Triatoma*, which is rare in museums. Flagellates in the form of Crithidia were found in the alimentary canal of the captured specimen, from which three guinea-pigs were successfully inoculated. In one of these, 42 days after inoculation, *Trypanosoma cruzi* was found in the blood. The author points out, however, that it is not always possible to find trypanosomes in the peripheral blood in every case of successful inoculation, and states that the presence of Chagas's disease in a locality may be diagnosed with more certainty by the examination of the intestinal contents of the *Triatomas* than in any other way. He goes on to express the opinion that Chagas's disease is an infection which will be found to prevail all over Tropical America wherever species of *Triatoma* are found. He has received reports that infected *Triatomas*, of an uncertain species, have been found in the Republic of San Salvador, and he believes that even in Texas and Florida, where *Triatoma sanguisuga* is common, Chagas's disease may be found to exist.

ii. A note recording the receipt from Dr. L. E. HURTADO, of San Salvador, Central America, of specimens of *Triatoma dimidiata* (var. *maculipennis*, Stal), and *Rhodnius prolixus*, Stal. The sender of the specimens furnished the additional information that he had found specimens of *T. dimidiata* infected with crithidial forms of *Trypanosoma cruzi*, and had been able to obtain infection of guinea-pigs and rabbits therewith, after an incubation period of 25 days. In addition to *T. dimidiata* already mentioned, *T. rugulosa* occurs in Costa Rica, *T. venosa* in Costa Rica and Panama, and *T. rufotuberculata* in Panama.

J. B. Nias.



## TYPHUS.

PLOTZ (Harry), OLITSKY (Peter K.) & BAEHR (George). **The Etiology of Typhus Exanthematicus.**—*Jl. Infect. Dis.* 1915. July. Vol. 17. No 1. pp. 1-68. With 1 plate and 16 curves.

The first part of this article, on bacteriological studies, is by Plotz, who has succeeded in isolating a bacillus from the blood of both epidemic and endemic cases of typhus. Cultures were only obtained by using anaerobic methods, the most satisfactory being that of LIBORIUS-VEILLON, serum-glucose-agar being employed in place of glucose agar.

The colonies usually appear in the lower two or three centimetres of the tube, occasionally higher, but never within three centimetres of the top. The colony appears round and opaque, varying from 1 to 6 mm. in diameter and in cross section it is Y shaped, brownish in appearance and soft in consistency.

The organism is a small, pleomorphic, Gram-positive bacillus, non-motile, not encapsulated and not acid-fast. Its length varies from 0.9 to 1.93 microns, its breadth being from one-fifth to three-fifths its length. Most of the organisms are straight; occasional ones are slightly curved. Coccoid bodies also occur. The ends are rounded or slightly pointed. In smears from solid media the organisms lie irregularly, there being no definite arrangement. Degeneration and involution forms appear early, so that after repeated transplantations the organism may assume a different morphological appearance from the bacilli in the original culture.

In addition the authors give the cultural characteristics of this organism. As shown in the accompanying table it is evident that anaerobic conditions are essential to its growth.

These organisms, isolated from cases of endemic and epidemic typhus, were found to be identical with those isolated by blood culture from eight guinea-pigs and one monkey in which the disease had been produced experimentally.

The organisms were most abundant in the blood of patients on the fourth and fifth days before the crisis. The degree of bacteraemia seems to be related to the severity of the infection, for in epidemic cases 51 cc. of blood were used and 74 colonies obtained, whilst in endemic cases 436 cc. of blood were used and only 33 colonies found.

Because of the late maturation of the colonies the results of blood cultures are usually only known after the termination of the illness and therefore this method is only of diagnostic value in confirming the clinical diagnosis. For this organism the authors propose the name of *Bacillus typhi-exanthematici*.

The second part of the article, on serological studies, is by Olitsky and contains an account of the complement fixation, agglutination, precipitation, other antibody reactions; the identity of the organism obtained from endemic typhus fever with that isolated from epidemic typhus fever; serological studies in animals, serological reactions in individuals after exposure to typhus fever, the relation between the serological results and typhus fever.

**TABLE I.**  
**Results of Cultivations in Various Media in Deep Tubes.**

[illegible]

The results are given in detail in tabular form and show that there is a most intimate relation between the typhus bacillus and typhus fever. The serological reactions occur in an orderly manner. Complement-fixing bodies are usually not seen at the height of the disease, but are demonstrable as the crisis is attained and increase in concentration in the post critical, afebrile state; the same is true of agglutinins, as well as precipitins. These antibodies are developed in the body as the result of an antigen circulating at the height of the disease. They are demonstrated *in vitro* when the organism isolated from the blood of typhus fever patients is used as artificial antigen. Hence, but one conclusion is possible: typhus fever is a reaction against this organism.

Although these reactions occur in coincidence with the process of immunity, they are merely signs which usually appear in immunization, but are not indicators of the existence of absolute immunity.

Strong serological reactions were obtained in sixteen cases in which bacteria were not found at the height of the disease.

The third part of the article, on experimental studies, is by all three authors and the results show that a bacillus, identical with that recovered from patients with typhus fever, can also be isolated from the blood of animals in which the disease has been reproduced by inoculation of typhus blood. In such animals, the frequency of the bacilli in the blood is directly proportional to the severity of the illness. In individual animals it is greatest at the height of the disease.

Typhus blood was found to be infective only if it contained a sufficient number of the bacilli.

From all the above observations and experiments the authors consider themselves justified in concluding that this bacterium is the causative agent of typhus.

[For further details those interested should consult the original article, which contains an exhaustive account of the experiments.]

E. Hindle.

**FOSTER (George B., Jr.). Endemic Typhus Fever in the Philippine Islands. Observations based on a Study of Twenty-Three Cases occurring among Filipinos at Camp Keithley, Mindanao, P.I., with the Results of Animal Inoculations.—Arch. Internal Med. 1915. Sept. 15. Vol. 16. No. 3. pp. 363-381. With 3 charts.**

These twenty-three cases of typhus are the first to be recorded from the Philippines, although the disease has probably existed there for an indefinite period. The writer studied these cases and also was successful in infecting monkeys and guinea-pigs with the disease. Transmission experiments were not attempted, but everything points to lice being the transmitting agent. In this case the head louse, *P. capitis*, must be responsible, for the body louse, *P. vestimenti*, is generally stated to be absent from the Philippines.

The symptoms of the disease call for no special remarks, as they are merely those of somewhat mild attacks of typhus.

E. H.

CIAVALDINI. *Relation d'une épidémie de typhus exanthématique (mars-avril 1915).*—*Bull. Acad. Med.* 1915. Vol. 74. No. 28. pp. 63–64.

In Algeria, as a result of the impoverishment of the country caused by the present war, the poorer natives are insufficiently fed and these conditions have been accompanied by the appearance of typhus in various localities. The author describes the epidemiology of a small outbreak that occurred in his province of El-Arrouch and the means that were taken in order to stamp it out.

E. H.

KURIAZIDES (K. N.). ΚΥΡΙΑΖΙΔΟΥ (Κ. Ν.) Περὶ τῆς ἐν Ἑλλάδι κατὰ τὸν Βαλκανοτουρκικὸν πόλεμον ἐμφανίσεως τοῦ εξανθηματικοῦ τύφου καὶ τοῦ τρόπου τῆς καταπολεμήσεως αὐτοῦ. [On the Outbreak of Exanthematic Typhus in Greece during the Balkano-Turkish War and the Means taken to deal with it.]—, 'Ἀρχεὶα Ἱατρικῆς.' (*Arch. de Méd.*) 1915. Apr. 1–20. Vol. 10. Nos. 10–12. pp. 105–112. With 2 figs.

An account of the means taken to combat a number of small outbreaks of typhus fever which occurred, either in camps of refugees from Thessaly, or amongst bodies of Turkish prisoners in Greece. The number of cases detected, only amounted to 60 in all, of which 11 died, giving a mortality of 23 [? 18·3] per cent.

The procedure followed was to isolate all detected cases of typhus at once, and to disinfect them from lice before taking them into hospital. With this object every patient was stripped of his clothing and given a warm bath, the hair being cut off, in the case of men, and disinfected with paraffin in the case of women. The body was then anointed all over with camphorated oil, and clean clothing put on, after which the patient was put to bed, the result being that not one of the medical men or nurses in attendance contracted the disease. The clothing taken from the patients was simultaneously sterilised in a hot oven, and one of the men employed on this work contracted typhus. A similar procedure was followed with all contacts in the camps. Every person was made to take off his clothing in an empty house, and was then washed all over with an antiseptic solution of either 1 per 1,000 perchloride or 3 per cent. carbolic, after which the body was anointed all over with camphorated oil. The clothes of the individual were meanwhile being sterilised outside the house by means of a portable steam oven, of which a figure is given, in which the garments were kept for half an hour; they were then put on again by the owner. By these means all extension of the outbreaks was prevented. Schedules of suitable instructions were at the same time distributed to all the public authorities, and in this way the whole trouble was nipped in the bud. A table showing the total number of persons involved in the different outbreaks is appended.

J. B. Nias.

**SKUTETZKY (Alexander).** *Die Flecktyphusepidemie im k. u. k. Kriegsgefangenenlager in Marchtrenk, Ob.-Oesterr., im Jahre 1915.* [The Typhus Epidemic in the Prisoner-of-War Camp in Marchtrenk, Upper Austria, during the Year 1915.].—*Wien. Klin. Woch.* 1915. Aug. 19. Vol. 28. No. 33. pp. 887–891. With 9 curves.

The writer was the chief physician in a large prisoner-of-war camp and he records his notes on typhus from the 8th February, 1915, when there were about 900 men in the camp up till May, during which period the number of prisoners increased to 8,000 or more. Typhus broke out in the camp during February, attaining its maximum on February 24th when there were 40 fresh cases. After this the number of new cases diminished but there was always a recrudescence of the disease after each influx of new prisoners. The new cases were always amongst the fresh arrivals and never appeared after the 16th day, from which the author concludes that the incubation period practically never exceeds 16 days.

The patients were carefully freed from body lice on entering the camp and by this means the typhus was prevented from spreading and no cases occurred amongst the hospital staff. From his experiences the author is of the opinion that the body-louse is solely responsible for the transmission of typhus.

The manner in which the disease was restricted to each crop of new arrivals showed that the disease was not endemic in the camp, but was reintroduced with each consignment of prisoners, who were infested with lice.

Interesting curves are given showing the prevalence of typhus in the camp and the way it disappeared after destroying all body lice.

E. H.

**BORAL (H.).** *Zur Differentialdiagnostik und Prophylaxe des Flecktyphus.* [The Differential Diagnosis and Prophylaxis of Typhus.]—*Wien. Klin. Woch.* 1915. June 17. Vol. 28. No. 24. pp. 641–645. With 7 curves.

The writer finds that certain cases of typhoid may show a typical typhus exanthem and cases of typhus occur associated with typical typhoid symptoms. In the early stages it is impossible to distinguish the two diseases with any certainty by clinical methods, and the only means of obtaining a correct differentiation between typhoid and typhus is by means of a serological and bacteriological examination of the blood.

Typhus is not infectious during the incubation period and lice that feed on a patient at this stage of the disease do not become infective.

In the initial stages of typhus and also when the exanthem is well developed there is little danger of the disease spreading in the absence of lice, but the author considers that fleas may possibly constitute a source of danger, though no direct evidence is forthcoming suggesting that they are able to transmit the infection.

E. H.

SABELLA (P.). **Il tifo esantematico o tifo degli accampamenti.** [Exanthematic Typhus, or Camp Fever.]—*Polichinico*. Sez. prat. 1915. Aug. 29. Vol. 22. No. 35. pp. 1164–1167; and Sept. 5. No. 36. pp. 1197–1205.

In view of the possible importation of typhus into Italy, as the result of the present military operations, the author thinks it well to supply an exhaustive systematic account of the disease for the benefit of Italian practitioners. Spotted typhus is ordinarily so rare in Italy that the few sporadic cases that do occur are generally wrongly diagnosed. Due stress is laid on the importance of the louse as a carrier.

J. B. N.

LANCET. 1915. June 12. p. 1251. **The Spread of Typhus Fever by Lice.** [Annotation.]

The writer calls attention to some of the old writings on this subject and mentions the report of an eye-witness and victim of the disasters of Napoleon's Russian campaign in 1812 appearing in that vivid book "Mémoires du Sergent Bourgogne."

In its retreat from Moscow, Napoleon's army was harassed by a severe epidemic of typhus carried by vermin and the soldiers spread death and destruction by this disease wherever they passed through Germany on their way back.

Dr. KRANTZ, a Prussian army physician, published a report in 1817 in which the relation between lice and typhus is mentioned, and also notes on open air treatment of the disease. This form of treatment resulted in a mortality of only 2 or 3 per cent., while patients in ordinary hospitals died in large numbers and infected physicians and nurses who attended them.

The open-air treatment abolished the period of convalescence, for three days after the patients had been free from fever for 24 hours, they were fit for half a day's march or more.

Various methods of killing lice are briefly dealt with and some are quoted from a circular recently issued by the German Imperial Board of Health. The parasiticial drugs recommended are sabadilla vinegar (containing veratrine) kerosene, eucalyptus oil, and balsam of Peru. WEYLAND in the Franco-Prussian war found that exposure to benzine vapour for two or three hours killed all lice.

The German State railways have an excellent plan for cleaning their carriages. The whole railway carriage is run into a large iron cylinder which is hermetically sealed; then the air is partially exhausted and the contents of the cylinder warmed up by steam pipes. The lice infecting the upholstery can survive exposure to a partial vacuum, but when the heat is turned on their body fluids are evaporated at the low pressure and they die of desiccation.

E. H.

FRAENKEL (Eugen). **Zur Fleckfieberdiagnose.** [On the Diagnosis of Typhus.]—*Munch. Med. Woch.* 1915. June 15. Vol. 62. No. 24. pp. 805–808.

A somewhat lengthy article in which the writer calls attention to his previous paper on the pathological histology of typhus [see this

*Bulletin*, Vol. 3, p. 564] and emphasises the importance of the diagnostic aids thus provided. The results obtained previously have been confirmed by the examination of several more cases since the outbreak of war and notes are given of the results of a pathological investigation of eight of these patients.

E. H.

**DIETSCH (Carl).** *Die künstliche Stauung als diagnostisches und differentialdiagnostisches Hilfsmittel beim Fleckfieber.* [Artificial Stasis as a Diagnostic and Differential Diagnostic Aid in Typhus.]. — *Munch. Med. Woch.* 1915. Sept. 7. Vol. 62. No. 36. pp. 1231-1232.

The author points out that there are three stages in the development of the typical exanthem. In the first stage there is a hyperaemia, that appears on the abdomen, chest, and extremities as scattered rose coloured spots. This hyperaemia is followed by stasis of the smaller blood vessels, finally resulting in a total block of the vessels. As a result the exanthem deepens in colour, becoming cyanotic in appearance, this constituting the second stage. In the third and last stage brownish pigment spots develop, which are often very dark and generally appear after the expiration of the fever, when the patient is beginning to improve.

By artificial stasis of the vessels, the author finds that it is much easier to recognise the exanthem in cases where it is not characteristic, or is sparingly developed. It is only necessary to put a bandage round the arm. After engorgement of the vessels any exanthem shows up more clearly and the passage from the first to the second stage in the development becomes evident, the rose-coloured spots gradually turning blue. Finally, brown pigment can be made to show up even in the second stage of the exanthem.

The manner in which this exanthem develops is sufficient to distinguish it from the eruption in the case of typhoid and the author strongly recommends this method.

E. H.

**LIPSCHUETZ (B.).** *Zur Kenntnis der Klinik des Flecktyphus nach Beobachtungen an der Przemysler Epidemie im Frühjahr 1915.* [The Clinical Aspects of Typhus from Notes on the Przemysl Epidemic of Spring, 1915.]—*Wien. Klin. Woch.* 1915. Aug. 12. Vol. 28. No. 32. pp. 856-860. With 1 chart.

The writer made notes on the disease during the great epidemic of typhus in Przemysl that occurred in the spring of 1915. As a result of his observations he is of the opinion that two stages of typhus may be distinguished: a pre-exanthematous stage and the exanthematous febrile stage. The former is distinguished by the presence of an irregular fever not rising to more than 38° C. and sometimes dropping to normal, and certain vague symptoms such as headache, backache, etc. This stage generally lasts about three days and is succeeded by the exanthematous febrile stage during which the characteristic

exanthem appears and also the temperature rises to 39° or 40° C., rarely if ever being as low as 38° C. The exanthem may be of various types :—

1. Generalised exanthem on the body.
  - (a) Small macular type with eruptions of uniform size.
  - (b) Large macular type, with various different sized eruptions.
2. Petechial exanthem.
3. Eruption especially developed on the elbow and upper arm, but similar to that on the trunk.
4. Localised on the palms of the hands and soles of the feet, with various clinical forms.
5. Very early-formed small petechiae in pre-existing growths.

The mortality during the epidemic was about 5 to 6 per cent., but the cases were often complicated by the presence of other diseases. A very large number of cases occurred amongst the soldiers of the Army Medical Corps and the hospital attendants, owing to the difficulty of protecting them against louse infection.

E. H.

MAITLAND (T. Gwynne). **Notes on the Typhus Epidemic in Serbia, 1915.**—*Brit. Med. Jl.* 1915. Aug. 21. pp. 283-285

The writer is director of the typhus colony at Skoplie (Uskub), Serbia, and from March 1st to the end of April, 1915, about 1,800 cases of typhus passed through his hands. The process of disinfection adopted by Dr. Maitland and his limited staff is described in some detail. The patients were shaved and carefully disinfected before being admitted to the wards, and his policy seems to have been successful, for the disease was kept under control.

The writer then gives an account of the symptoms and lays especial stress on the necessity of paying attention to the hygiene of the mouth, the neglect of which commonly leads to such complications as parotitis, laryngitis, and otitis media. In most cases the onset of the disease was slow, a rather unusual feature in most epidemics, and the great infrequency of pulmonary stasis, where there was often much cardiac asthenia, is very striking.

The two most fatal types of the disease are the so-called fulminating cases and the cases exhibiting circulatory stasis. Treatment was entirely symptomatic and the writer considers that the use of alcohol in any form is to be avoided. The writer's experience did not show that fresh air was such a potent factor as it is advertised to be, though naturally it is a *sine qua non* in all diseases.

E. H.

KREIBICH (C.). **Maculae coeruleae bei einem Falle von Typhus exanthematicus.** [Maculae coeruleae in a Case of Typhus.]—*Wien. Klin. Woch.* 1915. June 3. Vol. 28. No. 22. pp. 591-592.

The writer records a case of typhus on which blue spots were found in between the typical typhus exanthem. *Pediculus pubis* was found on searching the patient's body and nits of the same species were found



along the eye-lashes. The blue spots, therefore, were probably the result of the bites of these lice and it is considered probable that *Pediculus pubis* in addition to *P. vestimenti* is responsible for the transmission of typhus.

E. H.

LEVY (G. H.) & KANTNOR (J. L.). **Study of a Case of Epidemic Typhus Fever Imported into Central New York.**—*Boston Med. & Surg. Jl.* 1915. Sept. 23. Vol. 173. No. 13. pp. 473-476. With 2 figs.

The record of a case of typhus in a Macedonian immigrant who was admitted to a hospital in Syracuse. The authors give a full account of their clinical observations and a chart showing temperature, pulse, respiration, and blood pressure, with another showing leucocyte counts.

E. H.

MOLLOU (W.). **Beitrag zur Therapie des Flecktyphus.** [A Note on the Treatment of Typhus.]—*Wien. Med. Woch.* 1915. June 5. Vol. 65. No. 23. pp. 886-891. With 5 figs.

The author has treated five cases of typhus by means of subcutaneous injections of sensibilised typhoid vaccine, and gives the clinical history of three of these patients in detail together with curves showing the course of the temperature. The duration of the fever saw eleven days in the first; nine days in the second; and 17 days in the third, so that the course of the disease was curtailed. The vaccine was administered in 0.4 gm. doses subcutaneously according to KORÁNYI's technique.

The author does not attempt to explain the reason why typhoid vaccine seems to affect typhus, but points out that diphtheria anti-toxin is effective against erysipelas, and other analogous cases can be found.

E. H.

ROUBITSCHKE (Rudolf). **Die Behandlung des Flecktyphus mit normalem Pferdeserum.** [The Treatment of Typhus with Normal Horse Serum.]—*Wien. Klin. Woch.* 1915. July 1. Vol. 28. No. 26. pp. 706-707. With 3 curves.

The author has treated 25 cases of typhus with subcutaneous injections of normal horse serum (without phenol) and finds that the course of the disease is considerably affected thereby. At first the serum is administered in doses of 1 cc., but this is increased to 3 cc. if necessary, the injections being continued daily until the temperature is reduced to the normal. The author's results prove that this treatment has a very beneficial effect, reducing the fever and shortening the course of the disease, and it also lessened the mortality from an average of 30 per cent. to about 6 per cent.

Charts are given of the course of the temperature in two of the treated cases and one untreated case for comparison.

E. H.

WERTHEIMER (Heinrich). **Ueber das Verhalten des Flecktyphus bei direkter Sonnenbestrahlung.** [The Retarding of Typhus by the Rays of the Sun.]—*Wien. Klin. Woch.* 1915. June 24. Vol. 28. No. 25. pp. 678–679.

The writer exposed patients suffering from typhus to the rays of the sun for an hour at a time. The temperature was lowered by  $1.7^{\circ}\text{C}$ . in one case and  $1.1^{\circ}\text{C}$ . in another, but rose again after the treatment was stopped. The author suggests that the sun's rays may have an effect on the virus of the disease.

E. H.

RENAULT (Jules). **Mésures prophylactiques contre le Typhus Exanthématique et le Typhus Récurrent.**—*Paris Méd.* 1915. July 24. Vol. 5. Nos. 11–12. pp. 206–212.

After a short general account of these two diseases the author calls attention to the fact that both are transmitted solely by the agency of lice, and then proceeds to discuss various methods of prophylaxis, all based on the prevention of infection with lice. The method of treating persons infected with lice is described in detail. Each patient is made to remove all his clothes in one room and then passes into another room where he is treated personally. All these rooms are disinfected daily by washing out with 5 per cent. carbonate of soda and from time to time are fumigated with sulphur. Spraying with formalin is said to be ineffective.

The clothes of the patient, including hat and boots, are put immediately into a metallic box with a lid and sprayed over with 40 to 50 cc. of benzine which kills all lice in 15 or 20 minutes. Cotton fabrics are then boiled for 10 minutes in water containing 5 grams carbonate of soda to each litre. Woollen clothes are disinfected either by stoving or fumigation with sulphur. It is necessary for this sulphur fumigation to take place in the presence of water; otherwise it is not effective. Another method is to employ steam under pressure, or formalin, but in the latter case the stove must reach a temperature of at least  $80^{\circ}\text{C}$ . The patient himself is taken into a room where he is bathed and carefully washed with soap from head to foot. If his hair is long it is advisable to cut it all away, both from the head and body in cases of infection with *P. pubis*, before employing any further parasitocidal agent. All the hair is collected and burnt. After washing, the patients body is rubbed over with one of the following preparations, especial attention being paid to the head, beard, axillae and pubic regions:—

- a. Camphorated oil (10 per cent.).
- b. Oil of turpentine (15 per cent.).
- c. Camphorated spirit (10 per cent.).
- d. Chloroform water (5 per 1,000).
- e. A mixture of equal parts of oil and petrol.
- f. Vaseline and xylol: 90 drops of xylol mixed with 30 grammes of vaseline.
- g. A solution of Anisol (Anisol 5 cc.; 90 per cent. alcohol 50 cc.; water 45 cc.).

- h. Benzine. On the head applied under a bonnet; on the body under a cloak, the benzine being applied on both sides of the body.
- i. Grey ointment. Especially used for the treatment of *P. pubis*. It is advisable to restrict its use to the pubic and axillary regions and to wash off all ointment two hours after its application.
- j. Vaseline mixed with yellow precipitate in the proportion of 1 in 50, for the treatment of *P. pubis* in the eyelashes and eyebrows.

All these preparations destroy the lice but not the eggs, and it is necessary to repeat the treatment daily for six or seven days in order to destroy the parasites as they emerge from the eggs.

Finally, the author recommends certain measures to be taken in cases of recognised typhus, amongst which the most important is a careful disinfection of the person and clothes of all occupants of the house, in addition to the patient, as well as disinfecting the house itself.

F. H.

**LEGENDRE (Jean).** Destruction des poux de corps par le crésyl et le brossage.—*Bull. Soc. Path. Exot.* 1915. May. Vol. 8. No. 5. pp. 280-283.

The author finds that a 2 per cent. mixture (by volume) of cresyl with water kills body lice after 5 to 10 minutes exposure. The mixture does not seem to remain active after a delay of 24 hours. Cresyl does not alter the colours of clothes and when the latter are taken out and immediately rinsed in water they soon lose the odour of the parasiticide.

With regard to the coats and other parts of the clothes one can remove the eggs by brushing any parts liable to be infected with a stiff brush. The best method is to immerse one's underclothes in the cresyl and at the same time carefully brush the outer garments. By employing these means the writer claims that all body lice can be removed with certainty and the methods are easy of application in the field.

F. H.

**SERGEANT (Edm.) & FOLEY (H.).** Destruction par l'essence d'Eucalyptus des poux du corps, agents transmetteurs de la fièvre récurrente et du typhus exanthématique.—*Bull. Soc. Path. Exot.* 1915. June. Vol. 8. No. 6. pp. 378-381.

The authors have studied the action of eucalyptus oil on *Pediculus vestimenti* and find that when it is placed on clothes infested with these vermin the latter are killed very rapidly. Experiments were performed on a dog and some men heavily infested with lice. The dog was rubbed with a few drops of the oil and 48 hours after not a single living louse could be found.

Eight men heavily infested with lice had eucalyptus sprayed over their clothes and after 24 hours no living parasites could be found in any part touched by the oil. During several days no lice could

be found if enough of the oil had been employed, but eggs are not destroyed by the treatment, and therefore it must be continued at least eight days.

When it is impossible to change one's clothes, this oil constitutes a good means of killing *in loco* all body lice, for it is both cheap and effective.

E. H.

**ORTICONI. Prophylaxie du Typhus Exanthematique. Procédé de Destruction Rapide des Poux de Corps.**—*Paris Med.* 1915. Apr. 17. Vol. 4. No. 49-50. pp. 480-481.

After various experiments the author recommends the employment of a 10 per cent. solution of formalin as the best means of destroying body lice. The clothes are sprayed over with this solution and it is found that after a few minutes all lice and their eggs are killed. The advantage of this method is its simplicity and the fact that the clothes are not injured and can be worn again almost immediately.

E. H.

**VON WASIELEWSKI. Ueber die Vorbeugung von Fleckfleberübertragungen auf Aerzte und Pfleger.** [On the Prevention of Typhus spreading amongst Doctors and Medical Attendants.]—*Munch. Med. Woch.* 1915. May 4. Vol. 62. No. 18. pp. 627-628. With 1 fig.

After some notes on the biology of *Pediculus vestimenti* the author proceeds to emphasise the importance of all patients in typhus hospitals being freed from lice as quickly as possible. Not only their personal clothes but also any bed clothes should be treated, and medical attendants in hospitals should wear high rubber boots to prevent any lice getting on their legs.

In short the author points out that the only way of avoiding infection is to avoid getting bitten by lice.

E. H.

**GERWIN. Eine Schutzvorrichtung gegen Flecktyphus.** [A Protective Preparation against Typhus.]—*Munch. Med. Woch.* 1915. June 8. Vol. 62. No. 23. p. 802.

The writer is in charge of a prisoner-of-war hospital at Wetzlar and finds that 5 per cent. cresol soap solution is a very efficient agent for destroying lice and thus preventing typhus. Patients were washed with this before entering hospital and not a single louse or egg ever remained alive.

In the case of a few typhus cases that were brought in, a wooden frame was put round the bed and 5 per cent. cresol soap solution run into a groove cut all round the top of the frame. In this way any stray lice from the bed could not cross this moat and in between the frame under the bed was sprayed with 5 per cent. carbol paraffin.

By adopting these methods the writer has kept his hospital entirely free from any cases of typhus breaking out there.

E. H.

EYSELL (A.). i. **Ein einfaches Vorbeugungsmittel gegen Verlausung und deren Folgen.** [A Simple Preventive against Louse Infection and its Results.]—*Arch. f. Schiffs- u. Trop. Hyg.* 1915. Mar. Vol. 19. No. 6. pp. 170–171.

ii. **Nachtrag zu "Ein einfaches Vorbeugungsmittel gegen Verlausung und ihre Folgen."** [A Further Note on "A Simple Preventive against Louse Infection and its Results."]*Ibid.* Apr. No. 8. pp. 238–240.

i. It has been known for many years that the workers in the sulphur mines of Sicily are not subject to malaria and this is attributed to the fact that mosquitoes are repelled by the sulphur-containing secretions of these workmen.

The author has tried the effect of using sulphur praeccipitatum on louse infested persons from the Eastern Provinces, and finds it most effective in destroying these parasites.

For a woollen shirt about two spoonfuls of the powder are brushed in back and front, and a small quantity brushed into the hems of the sleeves and the inner sides of the drawers. This method never fails to destroy all lice and the same agent is said to be also effective against bugs, fleas, biting flies, ticks and other parasites. Sulphur is preferable to naphthalene since the latter has an irritating action on the skin and a very pronounced smell.

ii. The author answers various queries to his previous note and emphasises that his method is prophylactic and not curative. Precipitated sulphur must be employed—flowers of sulphur is useless and colloidal sulphur (Sulphidal) is so dear that it is not likely to be used on a large scale. Sulphur soap is worthless as it does not affect the body lice, which are in the clothes and not on the body itself.

The sulphur will persist for at least two weeks and in most cases for a month. It should be brushed into any body-belts or cravats, if these are worn, as well as ordinary underclothes.

E. H.

NEUFELD (F.). **Zur Bekämpfung des Fleckfiebers.** [The Combating of Typhus]—*Med. Klin.* 1915. Mar. 28. Vol. 11. No. 13. pp. 365–367.

A general review with practical suggestions for avoiding the spread of typhus. With regard to the clothing worn by hospital attendants the writer recommends American oil-cloth, as the lice are unable to climb it. The ordinary hospital overalls are useless as the parasites are able to cling to it easily and get on to the body before the coat is removed. Certain experiments on the disinfecting power of  $\text{SO}_2$  showed that an exposure of four hours in an atmosphere containing 7 per cent. of the gas was fatal to both lice and their eggs even though contained in a ball of linen.

With regard to personal prophylaxis, essential oils and similar substances were found to be quite useless.

E. H.

**BALFOUR** (Andrew). **Typhus Fever, Lice, and the War: A Suggestive Fact.** [Correspondence.]—*Lancet*. 1915. June 19. p. 1311.

The writer calls attention to the fact that in 1913 no less than 258 tons of sabadilla seed were shipped from La Guaira to Germany. This seed contains veratrine and sabadilla vinegar, is apparently being used by the German Army as a protection against lice, so that the above mentioned fact suggests that their Government was carefully preparing for this war in 1913.

E. H.

**BROOKE** (Gilbert E.). **Contact Insecticides.** [Correspondence.]—*Lancet*. 1915. Sept. 4. p. 571.

The author, who writes from Singapore, finds the following mixture the most effective contact insecticide:—

*Stock solution.*—Carbon disulphide 1, kerosene 20, mixed first by shaking; then add "Sanitas Sypol" 7 (made by the Sanitas Company) and keep in a stoppered bottle.

*For use.*—Make a 10 per cent. solution in water, adding the water to the stock, and not the stock to the water.

This 10 per cent. solution is a milk-white emulsion and is practically permanent when corked up, but is better prepared just before use. The solution kills bugs within a second or two and is stated to kill cattle-ticks instantaneously. In addition two applications destroyed all the lice and their eggs on a small pariah puppy.

E. H.

**PEČIRKA** (Jaromir). **Chinin als Präventivmittel gegen Typhus exanthematicus.** [Quinine as a Preventive Agent against Typhus.]—*Prager Med. Woch.* 1915. May 27. Vol. 40. No. 21. pp. 246–247.

The author states that the causative agent of typhus should be sought for in the salivary glands and alimentary canal of the body louse. He then proceeds to discuss the mode of infection and recommends on theoretical grounds that quinine, in doses of 0.2 gm. daily for 20 days, should be administered to any person found infested with lice, or liable to infection with typhus. As a reason for this it is advocated that a slight alteration in the blood will adversely affect the nutrition of any parasitic insect feeding on it, and quinine is the simplest substance that could be taken for this purpose.

E. H.

**KLEMPFNER.** **Ein Beitrag zur Prophylaxe des Flecktyphus.** [A Note on Prophylaxis against Typhus.]—*Prager Med. Woch.* 1915. Apr. 29. Vol. 40. No. 17. p. 193.

The author calls attention to PEČIRKA's advocacy of quinine as a prophylactic agent against typhus and brings forward facts in support of it.

Fifty Russians were brought into an isolated camp and four days after their arrival a case of typhus occurred amongst them and during the next four days one on each. On the last day treatment with quinine was begun (0.2 gm. doses administered daily) and only one more case occurred amongst these prisoners. The treatment lasted for 21 days and no further cases occurred after it was discontinued.

The author mentions a case recorded by MARIKOVSKY of a battalion at Honvéd in which 160 cases occurred in 700 men. On March 14th there were still 64 cases and then treatment with quinine was begun and continued for 21 days. No further cases of the disease occurred amongst these men.

[These results suggest that quinine may be of great use as a prophylactic against typhus, but further experiments are desirable.]

E. H.

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## LEPROSY.

**McCoy (George W.). The Present Status of our Knowledge of Leprosy.**  
*Amer. Jl. Trop. Dis. & Prevent. Med.* 1915. Aug. Vol. 3. No. 2.  
pp. 83-91.

In this paper, the author gives a lengthy resumé of the subject up to date. He regrets that no conspicuous advance can be recorded in reference to the cure, or the problem of the transmission of leprosy.

Reference is made to the results of BAYON and REENSTIERNA, who believe that they have confirmed KEDROWSKY's work, and to CLEGG's, DUVAL's, and his own cultivations of acid-fast bacilli from leprous tissues, but he does not refer to the observations of FRASER and FLETCHER and of some others.

As regards human and animal inoculations he observes that "in a general way it is perhaps not too much to say that we have no evidence that leprosy has ever been produced in man or in the lower animals by artificial means."

Although reciprocal serological reactions have been reported between rat and human leprosy "the cultures are however different" and he does not believe that either disease is dependent on the other. He calls attention to the facts that in rat leprosy the organisms are largely confined to the lymph glands and that nephritis is found in about half of the diseased rats.

The serum of most lepers reacts with extract of leproma and CLEGG has prepared an active antigen by boiling acid-fasts with weak caustics. The reaction to tuberculin is referred to, and in this connection it is remarked that glandular tuberculosis is very prevalent among Hawaiian lepers.

From 40 per cent. to 90 per cent. according to different workers give the Wassermann reaction. Noguchi's huetin is always negative.

STICKER's theory of primary infection in the nose "remains unproven." "Healthy nasal 'carriers' have been observed."

At Molokai "even under circumstances of most intimate contact, only about 5 per cent. of the adult natives contract the disease."

As regards diagnosis, the author sounds a note of caution in depending alone on nasal microscopic findings.

Hopes of vaccine treatment have not been realised. HEISER's chaulmoogra injections seem to improve many cases. The author believes in segregation in endemic foci, or in localities where the disease is likely to spread.

P. S. Abraham.

**CURRIE (Donald H.). Discussion of Paper of Surgeon George W. McCoy entitled Present Status of our Knowledge of Leprosy.—**  
*Amer. Jl. Trop. Dis. & Prevent. Med.* 1915. Aug. Vol. 3. No. 2.  
pp. 91-97.

The author maintained that "the micro-organism cultivated by CLEGG and later by BRINKERHOFF, DUVAL and the speaker, is the acid-fast bacillus found microscopically in all leper nodules" and that it is the specific cause of the disease.



To explain the failure hitherto to transfer the disease artificially in men and animals he suggested that possibly a smaller dose—not subcutaneous—“incapable of exciting local leucocytosis, such as might occur under natural conditions, might be the point upon which successful inoculation hinges.” In his experience in Hawaii at least “90 per cent. of the cases had been in prolonged and intimate contact with a leper some years preceding the outbreak of the disease.”

He strongly believes in segregation, which he considered had not been given a fair trial in Hawaii—the native members of the government not being in sympathy with the work.

He remarked that the descendants of the French settlers who suffered from leprosy in Louisiana were also affected in the Northern States, and that it was “the people and the way in which they live and not the locality” which influenced the spread of the disease; important factors were squalor and unhygienic conditions. Like Dr. McCoy, he could not explain why male lepers to female were as 2 to 1.

He believes that two and a half per cent. of the Hawaiians have leprosy. After some observations on diagnosis and treatment he concluded by advocating the isolation of lepers, but the isolation should be as in Norway “of such a character that the patient and his relatives will not object to it.”

P. S. A.

**KATSAINS (George M.). The Relation of Leprosy to the Community.—**  
*Boston Med. & Surg. Jl.* 1915. July 8. Vol. 173. No. 2.  
pp. 53-57.

This paper gives a considerable amount of information relating to leprosy in Greece, where it seems to have been long endemic. It notably increased, especially in Peloponnesus, some time after the War of Independence in 1821. Most of the cities and villages were affected and the lepers were forcibly isolated and often compelled to live in caves and as outcasts. The spread was, in the author's belief, mainly due to the invasion of the Egyptian Army in 1825.

At the present time the disease is not often met with in Continental Greece but in the islands the number of lepers has been estimated at more than 1,000. At the leper asylum in Crete there are 230 patients, and in the asylum at Cyprus 250.

Large numbers are to be seen in Athens, where “driven out from every village or city in Greece, abandoned by friends and relatives and excluded by all communities” they come seeking cure and means of existence. Here they are unmolested, mix freely with the people and may engage in any or every occupation. On the other hand, in other parts of Greece the lepers are treated most inhumanely and banished from their villages and homes. The educated Athenians, in fact, following the teaching of ZAMBACO Pasha, believe that leprosy is inherited and not contagious. The author is also of this opinion, but admits that its transmission by contagion may occasionally take place under conditions of protracted intercourse, special predisposition, country, etc. He gives a number of interesting instances known to him which point to heredity and negative contagion.

He refers to the observations of Dr. PROTEINOS of Athens, who has come to the following conclusion: In cases of tubercular leprosy the Wassermann reaction is positive in 76 per cent.; in nerve leprosy in 38 per cent.; and in mixed cases 75 per cent.; it seldom changes from positive to negative and then only after eight or more injections of salvarsan; the curative effects of salvarsan are not encouraging, although nodules may fade away after 10 or 15 full injections. The author records one good result from salvarsan. In Athens no case of contagion has been reported and no leper born.

P. S. A.

**HONEIJ (J. A.). Leprosy and its Relation to Massachusetts.—*Boston Med. & Surg. Jl.* 1915. July 8. Vol. 173. No. 2. pp. 48-53.**

The author considers that the leprosy problem in Massachusetts needs consideration and action and refers to a case with marked symptoms not diagnosed for three years. The establishment of new endemic centres in South America, South Africa, Nigeria and New Caledonia leads him to fear their establishment elsewhere, and he is of opinion that even early cases are a source of danger to the public. He refers to the statistics of leprosy in the United States and especially to Massachusetts where there have been about 50 cases, two or three fresh ones coming every year. The great majority were foreigners—chiefly Chinese, Portuguese and Russian and three Americans. Since 1905 the lepers have been segregated at Penikese Island, 30 having been received, and 14 are now there.

The Resolutions of the last International Conference on Leprosy are quoted. The author maintains that the segregation of lepers in Massachusetts is particularly justified on account of its increasing trade with leper countries. He urges a more tolerant and sensible attitude towards lepers, the need of a modern hospital for their proper care, federal control of immigration and the establishment of national leprosaria. [As far as can be gathered from this and from some other papers recently reviewed on Leprosy in America, it would appear that with very few exceptions the truly American cases have all acquired their disease in leprosy districts and that leprosy is not "spreading" among Americans who have not sojourned in such places.]

P. S. A.

**MONTGOMERY (Douglass W.). Illustrations of the History of Leprosy.—*Jl. Amer. Med. Assoc.* 1915. Sept. 11. Vol. 65. No. 11. pp. 927-931. With 3 figs.**

In this interesting and suggestive essay the author attempts to clear up several misconceptions in connection with leprosy and discusses the origin of the terms "Elephantiasis" as used by the Arabs and the Greeks, and "Zaarath" of the Hebrews. He adopts the suggestion that the Greeks called the disease "Elephantiasis" because of the stump foot and dragging gait that were so frequently present, and accepts McEWEN's interpretation of "Zaarath" as "taboo," and that, as UNNA pointed out, "Zaarath" had a theological and not a medical meaning. In the Septuagint "Zaarath" was translated into the Greek word "lepra," and later, Constantine also translated

into Latin the Arabic word "djudsam," which signified the disease we now call leprosy, as "lepra." "Because of the mistake in the translation of a word in the Bible and a further mistake in applying Biblical precepts to this chronic infectious disease, leprosy came to be regarded as a highly infectious malady. The author further observes:—

"As a matter of fact, leprosy is very reluctantly contagious, and must require very special favouring circumstances in order for it 'to take.' A very modest degree of cleanliness hinders its transmission. As soon as a country becomes well to do and adopts the daily tidiness incident to modern civilized life, leprosy dies out. Although, therefore, the Biblical view of the highly contagious nature of leprosy undoubtedly aided in stamping out the epidemic of the middle ages, in modern life it works an unnecessary hardship on the afflicted, and should give place to a more reasonable attitude, agreeing with the real facts of the case."

[The reviewer can to a great extent endorse these views.]

P. S. A.

**MORROW (Howard) & LEE (A. W.). Symptoms and Diagnosis of Leprosy. With Report of Cases.**—*Jl. Amer. Med. Assoc.* 1915. Sept. 11. Vol. 65. No. 11. pp. 931-934.

The authors give a good account of leprosy in its various stages and manifestations as observed in San Francisco, especially at the Isolation Hospital. This contains at present 13 chronic cases, the notes of which are appended.

In reference to its differential diagnosis, they observe that the Wassermann reaction is frequently positive in nodular and "mixed" cases, and generally negative in anaesthetic cases. In almost all nodular cases, it is positive with leprosy antigen. In all types, the luetin reaction is negative, unless the disease is complicated by syphilis.

P. S. A.

**CHIPMAN (Ernest Dwight). The Etiology and Treatment of Leprosy.**—*Jl. Amer. Med. Assoc.* 1915. Sept. 11. Vol. 65. No. 11. pp. 934-937.

In discussing the etiology of this disease the author thinks it improbable that it spreads by direct inoculation on account of "the uniformly negative results in numerous human and animal experiments." He considers that, although the role of insects as intermediaries is as yet unproved, certain of them must be regarded with suspicion, especially flies, the bed bug and the acarid of scabies, and with regard to the latter he refers to HEISER's cases, 55 per cent. of which had been previously infected with scabies. In any scheme of national control, he suggests that segregation should be more or less complete according to the type and duration of the disease. Many cases of nerve leprosy, where no bacilli can be demonstrated in the nasal or other secretions, are not comparable with active nodular cases in infectivity.

As regards treatment, the various methods of which he shortly reviews, he favours HEISER's subcutaneous injections of chaulmoogra oil 60 cc, camphorated oil 60 cc. and resorcin 4 gm., as well as local cauterisations and surgical measures and hot baths.

P. S. A.

A noteworthy discussion on the above three papers\* and on the subject in general took place. Some points brought out may here be referred to. Dr. O'NEILL [in charge of the San Francisco Isolation Hospital] stated that when in 1878 the lepers in California were segregated, they were 82 in number; they have been gradually diminishing and now there are only 15. The cases were all imported; he had never seen one which had its origin in California. He considered that there was little or no danger of contagion from the ordinary nerve type and that when there were no open lesions, discharges from the nose or organisms found, the leper might be allowed to go free.

Dr. MCCOY [Honolulu] considered that the question of segregation may be largely a matter of geography; in certain communities leprosy does not spread. In New York, where there may be always from 40 to 50 cases, there has been no case of local origin; measures different from those needed in Hawaii might therefore suffice. In Hawaii nodular and ulcerating nerve cases are segregated, and others put under parole. Although the bacilli are not usually found in the nasal cavities in early cases they may occasionally only be found there even in pure nerve leprosy. He emphasized the help given by surgery, and referred to the work of Dr. HOLLMANN in Honolulu. He had recently seen a child with leprosy, aged 19 months—the earliest case he knew—with a nodule on the arm. This was excised although he did not believe that there is a recognisable “initial lesion” of leprosy.

Dr. RAVOGLI [Cincinnati] thought that “leprosy is very slightly contagious, yet is growingly contagious.” It frequently begins with an ulcerated wound on the foot.

Dr. SUTTON [Kansas City] asked whether the different types of the disease might not be due to different strains of the bacillus?

Dr. SCHMIDT observed that the serological diagnosis of leprosy was not of great value. Serologically and bacteriologically human and rat leprosy were the same.

Dr. LAIN [Oklahoma] remarked that leprosy had not reached the American Indians, many thousands of whom he had examined. Dr. Howard Fox [New York] agreed that there is no reference in the Old Testament to any disease which can be positively recognised as the leprosy of the present day. In the legal control of lepers he thought that harmless anaesthetic cases should be distinguished from nodular cases in the ulcerating stage.

Dr. MONTGOMERY [in reply] considered that an erythematous leproid was often the initial lesion. He advocated a national leprosarium, which should not be in an endemic area where the disease might thrive.

Drs. MORROW, LEE, O'NEILL and CHIPMAN also replied.

P. S. A.

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\* Read before the Section of Dermatology at the Sixty-sixth Annual Session of the American Medical Association, San Francisco, June, 1915.

**BLASCHKO (A.). Kann uns die Lepra in den russischen Ostseeprovinzen gefährlich werden?—*Deut. Med. Woch.* 1915. June 3. Vol. 41. No. 23. pp. 676-677.**

The author considers that the penetration of the German army into the Baltic Provinces of Russia raises a new danger. In 1896 he pointed out that in Germany Memel alone was a leprous district, and that the few cases that then existed had probably arisen from intercourse with the neighbouring Russian provinces where at least 1,000 cases were known and where leper hospitals had long been established. Although, in his opinion, leprosy can be transmitted, instances of this are so rare that some other special conditions must be associated. He suspects that the disease is spread by blood-sucking insects and that the immunity of certain individuals may be due to the fact that fleas, for example, are not attracted to everyone. The following suggestions are recommended:—(1) When troops move to fresh quarters the Head of the District should state whether there are lepers or leper hospitals in the neighbourhood; the German army doctors should communicate with the local doctors on the subject. (2) No German soldiers should be quartered in houses where lepers have lived. (3) The troops should be protected from parasites by naphthaline, cresol powder, etc. (4) The books of leper hospitals should be examined and the names and addresses of discharged lepers noted.

P. S. A.

**DELÉPINE (Sheridan). Case of Suspected Leprosy at the Prisoners of War Camp, Handforth.—*Jl. R. Army Med. Corps.* 1915. June. Vol. 24. No. 6. pp. 576-579. With 2 figs.**

Professor Delépine reports a typical case of nodular leprosy in a German aged 53 interned in the war camp at Handforth. Since leaving Germany at the age of 21 he had been a ship's fireman, and had been in India, China, Mediterranean and Black Seas and America, but seldom remaining long on shore. About a year ago he burnt his foot, which swelled and was long in healing, being six weeks in hospital in Constantinople and later in a Black Sea hospital. After returning to his home in Sunderland, his face became affected; about two months ago he had been losing his voice and he had felt easily tired and heavy in the legs.

On examination (July 21st 1915) the face had a typical leonine appearance with thickening of the superciliary regions, nose, chin and ears, and loss of hair and eyebrows. The mucous membrane of the palate and pharynx was irregularly thickened, but no obvious change was observed in the anterior fourth of the nasal septum. The voice was reduced and roughened. Nodules and indurations were found on the arms and hands, and patches of discolourations, and reduced sensitiveness. The lower parts of the legs and the feet were more severely affected, and with a general purplish, coppery colour.

Microscopical examination of a number of the lesions revealed the presence of numerous lepra bacilli. Dr. Delépine considers that "the case should undoubtedly be isolated, more especially in consideration of the feelings of the other persons interned in the camp."

P. S. A.

O'BRIEN (C. M.). **An Address on Leprosy, with an Account of a Case, delivered before the Section of Medicine in the Royal Academy of Medicine in Ireland on May 21st, 1915.**—*Lancet*. 1915. Sept. 4. pp. 529-533. With 1 fig.

The author describes a typical case of early nodular leprosy in a man aged 38 born in Belfast, who had served 10 years in the army abroad, in Malta, Bermuda, Halifax, Jamaica and South Africa (5 years); since 1906 he had worked as a farm labourer in Ireland. In the autumn of 1913 a crop of boils appeared on the back of the neck and his eyes became red and swollen. In August 1914 he tried to rejoin the army, but was rejected because of a "skin rash." In March 1915 he came under Dr. O'Brien's care and was found to be suffering from leprosy. He complained of weakness on slight exertion, occasional shooting pains in the back and shoulders and at times sensations of "hot and cold" all over the body. He felt the skin of the face, especially the forehead, tight as if going to crack; it was thickened and furrowed, dark brown and glistening, the eyebrows prominent and tuberculated and with scanty hairs, nose thick, broad and flattened, chin broad and prominent, and the lips thick. There were infiltrations and tubercles on the neck, shoulders and nares and on the extremities. The hands were swollen and cushion-like on the back, ash-grey in colour, the thenar and hypothenar muscles flat and flabby. The reflexes were normal. No anaesthesia and the mucous membranes free. The patient showed no reaction with tuberculin. The Wassermann reaction was markedly positive although there was no evidence or history of syphilis. The bacilli of leprosy were demonstrated. In his preliminary remarks the author alludes to the early literature of leprosy, discusses the theory of contagion and among other points especially refers to BAYON's recent observations. A photograph of the case is given.

P. S. A.

HASSIN (G. B.), BURKE (Gordon) & NUZUM (John). **Leprosy or Syringomyelia?**—*Jl. Amer. Med. Assoc.* 1915. July 17. Vol. 65. No. 3. pp. 235-238. With 5 figs.

The authors remark upon the well-known difficulty of diagnosis of so-called nervous or anaesthetic leprosy from syringomyelia, and describe a case in point. A lady aged 62, born in Norway, presented herself with deformities of all four limbs. The forearms were covered with scars from burns and the fingers were gone. On the lower limbs the feet were absent and the stumps the site of large ulcers. Complete anaesthesia was exhibited on the forearms, hands and legs and patches of anaesthesia on the chest, face, eyelids and cornea together with a cataract, ectropion and conjunctivitis of one eye. The median, ulnar, musculo-spiral and peroneal nerves showed tenderness but no thickening and nodosities either upon them or on the "auricular magnus." Response to electrical stimulation in the muscles and nerves was normal and no discoloured spots were to be seen anywhere upon the skin. The tendon, skin and mucous reflexes were everywhere absent.

The affection started when 8 years old, with pain and weakness in the right foot, followed 4 years later by a perforating ulcer and subsequently by painful abscesses on the other extremities with ulceration and loss of bone. From time to time amputations were performed, the last 9 years ago, i.e., 43 years after the onset of the disease. Menstruation began at the age of 19, the menopause at 40. Two distant relatives had suffered from leprosy. Microscopically a number of sections of tissues from the legs were examined and in only two a limited number of bacilli resembling those of tubercle were found, but no so-called "lepra cells."

The authors regard it as a case of leprosy and not syringomyelia for several reasons:—Both upper and lower limbs were involved in the trophic changes and anaesthesia; the latter did not end abruptly and it was also present in patches on the face and chest; the tendon and mucous reflexes were absent; there was paresis of the upper branches of the facial nerve, with ectropion and anaesthesia of the lids and cornea; the absence of scoliosis, of muscular twitchings, of atrophy of the small muscles of the hands, and of electrical changes were also against the diagnosis of syringomyelia. The atrophy and absorption of the bones of the fingers as revealed by X rays and the absence of scars were moreover particularly characteristic of leprosy. The difficulty of finding typical bacilli and the absence of nerve thickenings were, in the authors' opinion, due to the old-standing chronic nature of the case.

P. S. A.

**CANDIDO (João). Lepra de forma syringomyelica.** [Leprosy simulating Syringomyelia.]—*Brazil Med.* 1915. Sept. 15. Vol. 29. No. 35. pp. 273-276.

Notes of a case of leprosy in a girl in which the tracts of anaesthesia in the limbs simulated to a certain extent the kindred anaesthetic features in syringomyelia. As the patient had lost several toes, and in addition gave a strong family history of leprosy, the diagnosis does not seem to have been very difficult to make, although leprosy bacilli could not be detected in pieces of skin excised from the anaesthetic areas.

J. B. Nias.

**LARA N. (A.). Lepra blanca en Yucatan.** [Anaesthetic Leprosy in Yucatan.]—*Rev. Med. de Yucatan.* 1915. Feb.-Mar. Vol. 10. No. 4-5. pp. 75-78.

A few remarks on the liability of confounding the anaesthetic forms of leprosy with vitiligo, and other dyschromatic lesions of the skin. The nasal mucus should always be examined in such cases for bacilli, iodide of potassium being given for two days previously in order to produce a catarrh. In this way the writer was able to confirm a diagnosis of leprosy in 8 out of 11 suspected cases of skin affection. One case is narrated at length.

J. B. N.

**HONEIJ (James A.). Leprosy—The Presence of Acid-Fast Bacilli in the Circulating Blood and Excretions.**—*Jl. Infect. Dis.* 1915. Sept. Vol. 17. No. 2. pp. 376-387.

Examinations were made at the Penikese Leper Colony as to the presence of bacilli in the blood, urine, faeces, sputum, nasal mucus and other secretions and discharges of lepers. The author refers to the observations of other workers, and describes his own careful methods and their results.

*Blood.* Of 28 examinations among 16 patients, 9 were positive, 3 doubtful and 16 negative.

*Urine.* Of 41 examinations in 16 patients, 6 were positive in 9 of them.

*Faeces.* Of 27 examinations in 16 patients, 10 were positive in 6 patients.

*Sputum.* In 41 examinations of 16 patients, 32 were positive and 9 negative; 14 patients giving positive and 2 negative results.

*Nasal mucus.* Sixteen patients in 41 examinations gave 34 positive, 6 negative and 1 doubtful result, 14 of the 16 having the bacilli.

*Ulcerations.* In 15 patients with bullae, ulcers and pustules the bullae were positive in 5, negative in 10; ulcers 13 positive and 2 negative; pustules, 7 positive and 8 negative.

*Tears.* Negative in 26 examinations with 13 patients.

Care was taken to obtain, prepare and stain the specimens uniformly, and to eliminate contamination. In the case of blood, urine and faeces local lesions were avoided. Inoculation of guinea-pigs and failure of cultivations proved that the bacilli were not of tubercle. The author concludes that the acid-fast bacilli were found frequently enough in the circulating blood and the secretions, etc., to indicate that these may play a part in the spread of the disease and that insect transmission may be a possibility.

A copious bibliography is appended.

P. S. A.

**FRASER (Henry) & FLETCHER (W.). The Cultivation of the Leprosy Bacillus.**—*Ann. Trop. Med. & Parasit.* 1915. July 31. Vol. 9. No. 3. pp. 381-382.

In their article "The Bacillus Leprae: Has it been cultivated?" in the *Lancet*, 1913 [see this *Bulletin*, Vol. 2, p. 502] the authors stated that "in common with other workers we have isolated diphtheroid organisms, but these are ubiquitous and demand no special consideration." They then considered that "the diphtheroids were contaminators, and had no relation with the leprosy bacillus; further investigations carried out during the past two years have confirmed that opinion." In the former experiments, cultures of a diphtheroid were only occasionally obtained in one or two tubes, but since improving the technique and excising nodules free from contamination, no cultures have been obtained. Material from 52 non-ulcerating nodular cases, and the media of every claimant to success have been employed without result.

The conclusion still is that the leprosy bacillus has not been cultivated, that the diphtheroids and other organisms are merely contaminators, and that there is no evidence that the acid-fast bacillus of Kedrowsky is the leprosy bacillus.

P. S. A.



- NAKAJO (S.) & ASAKURA (T.). i. **The Serologic Diagnosis of Leprosy.**—*Jl. Infect. Dis.* 1915. Sept. Vol. 17. No. 2. pp. 388-399.
- ii. **Further Observations on the Serologic Diagnosis of Leprosy.**—*Ibid.* pp. 400-402,

These papers describe an elaborate series of serological experiments, employing as antigens Koch's "old tuberculin," Wassermann's syphilitic antigen, leprous nodule, leprous clots, etc.

In 39 out of 42 leprous sera, distinct reactions, positive or negative, were obtained with old tuberculin, 21 positive in 24 tubercular and 6 in 15 anaesthetic cases. The reaction was in regular proportion to the severity of the disease, especially in the tubercular cases.

In a second series of observations with old tuberculin in 10 cases, 7 gave positive results.

Thirty-three cases examined by the Wassermann test gave 26 positive results.

The main conclusion arrived at is that, if the serum of a doubtful case produces positive results both with old tuberculin and the Wassermann antigen, the probabilities are that the patient is a leper.

P. S. A.

**FLETCHER (William). The Wassermann and Luetin Reactions in Leprosy.**—*Jl. of Hygiene.* 1915. July. Vol. 15. No. 1. pp. 102-126.

Dr. Fletcher examined 100 cases at the Kuala Lumpur Leper Asylum for the Wassermann reaction by the Browning, Cruickshank and McKenzie method, with positive results in 22, 12 being among 44 nodular, and 10 among 56 anaesthetic cases. In only one was there visible evidence of former venereal disease, but 33 admitted a history of syphilis, and of these 13 reacted positively. In a control group of 110 non-leprous persons there were 11 positive reactions, 8 being among 21 who admitted former syphilis. It did not appear that either the duration of the disease or its activity had much influence on the Wassermann reaction. Although seventeen of the 22 positive reactions were in advanced cases many old and progressing cases were negative. In some cases the reaction was exceptionally powerful—the deviation of complement amounting to as much as 50 or 30 doses.

Luetin tests in 21 lepers, 13 of whom gave positive Wassermann results, were negative, and lesions of 10 cases with positive Wassermann reactions showed no *Treponema pallidum*. These facts are in favour of the view that the positive Wassermann reactions were due to some other cause than syphilis and that leprosy itself may cause a positive deviation of complement by the Browning, Cruickshank and McKenzie method.

The observations are carefully tabulated and numerous references to the work of others are appended. The paper is an important contribution to the subject.

P. S. A.

**BARBER (Marshall A.). I. Experiments on the Immunization of Guinea Pigs by the Inoculation of Avirulent Tubercle Bacilli in Agar. II. Observations on Animals inoculated with Tuberculosis from Lepers.**—*Philippine Jl. Sci.* Sect. B. Trop. Med. 1915. Mar. Vol. 10. No. 2. pp. 145-161.

A monkey, inoculated subcutaneously with spleen pulp containing leprosy bacilli taken post-mortem from a leper, died in two months with lesions of tuberculosis. Spleen pulp from this monkey was inoculated into another monkey which died of tuberculosis in 29 days. A pure culture was made from the inguinal glands of the latter and inoculated into 20 guinea-pigs. Seventeen of them died of tuberculosis in an average of 120·6 days—with unusual enlargement of the spleen—nearly double the average ratios of a series dying of tuberculosis of human sputum origin. In three other series of inoculations with different leper spleens, part of the guinea-pigs developed tuberculosis, in one series only one in five.

P. S. A.

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## PLAGUE.

**JOHNSTONE (R. W.).** Report to the Local Government Board on the Progress and Diffusion of i. Plague, ii. Cholera, iii. Yellow Fever throughout the World during the Year 1913.—*Rep. to Local Govt. Brd. on Public Health & Med. Subjects.* vi + 110 pp. 1915. London: Printed under Authority of H.M. Stationery Office.

The first 64 pages of Dr. Johnstone's Report deal with the progress and diffusion of plague throughout the world during the year 1913. It is in itself a summary of the various reports dealing with the question, published in the different countries affected.

In most of the countries under observation there was no very marked change in the prevalence of plague during 1913 as contrasted with the preceding twelve months—India is a notable exception to this rule, as during 1913 a marked falling off in the reported mortality occurred. The provisional figures officially published for the areas under registration in British India show that 217,145 persons died of plague in 1913 as compared with 306,448 in 1912 and 846,873 in 1911. A consideration of these figures, however, affords no ground for assuming that plague prevalence has yet exhausted its virulence in India. During the first nine months of 1914, 227,149 persons died of plague in India—some 10,000 more than the plague deaths recorded for the whole of 1913. It is, however, satisfactory to learn that the present low standard of sanitation in India is undergoing progressive improvement and that most Indian municipalities are being equipped with a staff of trained sanitary officers whose efforts may, before long, be expected to secure reduction of the incidence of plague as well as of other preventable diseases.

Details are given of the various outbreaks of plague reported throughout the world during the year. In most cases the incidence of plague year by year, from the first introduction of the disease during the present pandemic, is given, and thus the course of the infection in a given locality is made readily apparent.

R. St. J. Brooks.

**ELKINGTON (J. S. C.).** A Review of Recent Literature and Work on the Epidemiology of Plague.—*Commonwealth of Australia. Quarantine Service. Publication No. 5.* 32 pp. With 1 map. 1915. Melbourne: Albert J. Mullett, Govt. Printer.

This Review is primarily intended for quarantine officers, and contains much useful information in a succinct form on the etiology and spread of plague, the diagnosis of the disease in man and rodents, the habits of rats and the measures of organised activity against the admission and spread of plague. In the latter connection attention is directed to the peculiarly dangerous geographical position of Australia. Numerous epidemic centres are distant but a few days travel from that country—to the northward Java, Hong Kong, Canton, Formosa; to the north-eastward, New Caledonia; to the north-westward Colombo. These facts afford ample reason for the constant watchful activity on the part of the Commonwealth Quarantine Service and the State Health Departments.

R. St. J. B.

BROOKS (Ralph St. John). **The Incidence of Plague in Europe.** [Correspondence.]-*Lancet*. 1914. Dec. 19. pp. 1437-1438.

STRICKLAND (C.). *Ibid.* 1915. June 19. pp. 1311-1312.

In this *Bulletin* [Vol. 5, p. 23], a paper by Strickland was summarised and a note appended in which some criticisms were made on certain of the conclusions arrived at. These criticisms were more fully stated in a letter by Brooks published in the *Lancet*, and to this letter Strickland replies, maintaining his former views. From the facts that in East Anglia a flea-rate of 2·7 [this figure Strickland concedes as the correct one, not that which he previously gave] was associated with a plague epizootic of 11 per cent. in the winter of 1910, and in the following summer-autumn a flea-rate of 4·5 was associated with an infection-rate of only 0·2 per cent., Strickland argued that the flea-rate could not be the main factor in determining the intensity of the epizootic. Brooks pointed out that the first figure represents the incidence in areas selected because they were probably infected, and that the latter figure does not represent any incidence at all, because as soon as an infected rat was got from a district, the supply of rats from that district was stopped. Strickland's reply is that the selection-method does not matter: 15,000 rats had been found with a plague incidence of 0·2 per cent. He contends that "if a flea-rate of 2·7 causes an epizootic of 11 per cent. among 123 rats in a town, village or hamlet, then a flea-rate of 4·5 should cause a much greater epizootic than 0·2 per cent. among any 15,000 rats one likes to examine," i.e., if the incidence depends significantly on the flea-rate. [This seems quite unjustified. It is of course only for infected populations that the relation between flea-rate and incidence is held to exist. The only incidence figure which can be obtained from the later investigation is that of 200 parishes 19 were infected, i.e. 9·5 per cent. The incidence in the infected parishes is unknown for the later investigation, and no comparison with them is possible. Implicit in Strickland's argument is the idea that because their flea-rate is high, the other parishes should have been infected, but this is a different question.]

J. Henderson Smith.

SWELLENGREBEL (N. H.). **Ueber die Zahl der Flöhe der Ratten Ost-Javas und die Bedeutung des Parallellismus von Flöhe- und Pestkurven.** [The Flea Infestation of East Java Rats and the Significance of the Parallelism of Flea and Plague Curves.]-*Zeitschr. f. Hyg. u. Infektionskr.* 1915. Mar. 1. Vol. 79. No. 3. pp. 492-510. With 7 figs.

With reference to the conclusions of the Indian Plague Commission that the yearly reappearance of epizootic plague in India is conditioned by the periodic increase in the number of fleas, the author observes that, while his experience in Java has been somewhat at variance with these opinions, it is very dangerous to criticise conclusions which are arrived at on epidemiological grounds in a determined district, in the light of other investigations conducted in another part of the world where, very likely, quite different conditions obtain.

In conformity with Indian experience, a correlation between the average number of fleas per rat and the number of plague deaths is often observed in Java, but there are important exceptions to this rule. The seasonal variation in the number of fleas per rat has been investigated in six districts in East Java, five of these being plague infected and the remaining district—Ngantang in the province of Malang—being free from infection. The flea counts, throughout the year, showed the least variation in Ngantang and in Surabaya, where very few cases of human plague occurred. In Ngantang the number of *X. cheopis* per rat varied from 0.4 in January 1912 to 1.0 in May 1913 and in Surabaya from 0.8 in May 1912 to 2.6 in July 1912 for *Mus norvegicus* and from 0.9 to 1.7 for *Mus rattus*. On the other hand very significant variations were observed in the districts of Kediri, Modjoroto and Sengguruh where epidemic plague flourished with great intensity. In Kediri the parallelism between the flea and plague curves was well marked; at the commencement of the year 1912, when the plague incidence was slight, the flea count reached a maximum of 2.6 while in the second half of the year, when the epidemic reached its maximum, the numbers of fleas per rat rose to 4.4. During the height of the epidemic of 1913 the flea count reached the figures 6.2 per rat. This correlation between the flea and the plague curve was no, however, always found to obtain, as is shown by the figures obtained for the district of Malang, where an actual antagonism existed between the curves. From June to October 1912 the flea count per rat fell from 1.8 to 0.9, whilst the number of plague cases increased from 12 to 29 per month.

The author is of opinion that, so far as Java is concerned, the increase in the number of fleas per rat during periods of epizootic plague, when it occurs, is conditioned by a "secondary concentration" of the flea population on the diminishing number of the rodent hosts available. The normal flea count is not the only factor by which the greater or lesser intensity of plague is brought about, although doubtless a certain amount of significance must be attached to it.

R. St. J. B.

**SWELLENGREBEL (N. H.) & HOESEN (H. W.) Ueber das Vorkommen von Rattenpest ohne Menschenpest in "klandestinen Herden."**  
[The Occurrence of Rat Plague without Human Plague in Hidden Foci.]—*Zeitschr. f. Hyg. u. Infektionskr.* 1915. Vol. 79. No. 3. pp. 436–451. With 3 figs.

It has been observed that in certain districts of Java, cases of rat plague may occur, and may continue to occur, which are not associated with human plague. Several examples of this state of affairs are here given in villages in the Javanese provinces of Surabaya and Kediri; such villages often being connecting links between places in which human and rat plague flourish side by side. These hidden foci are peculiarly dangerous, as they are apt to be overlooked by the sanitary authorities and become the means of spreading infection in the surrounding districts.

The circumstances that determine the transference of infection from rat to man are conditioned by the number of infected fleas available at a given moment of time and the number of living rats

that are available for the flea population at the same time. When the first number is great and the second small, the circumstances are favourable for an outbreak of human plague. The absence of human plague in European ports affected with rat plague may be explained through the prevalence of *Mus norvegicus* and the relative scarcity of rats in human habitations.

R. St. J. B.

**FERNANDEZ de YBARRA (A. M.). The Recent Outbreak of Bubonic Plague in Cuba.** [Correspondence].—*Lancet*. 1915. Aug. 7. pp. 307–308.

The opinion is here expressed that the present reappearance of plague in Havana is a recrudescence of the outbreak of 1912, which appeared to be extinguished by June 20th, 1914. During 1915 three human plague cases occurred in February, one in March, eight in April and four in May, up to the 7th of that month. In one instance three cases occurred in the same building—a charcoal store and depository for empty sacks in the residential part of the city. No rats were caught in the subsequent trapping and fumigation carried out on the premises. It is suggested that these facts show evidence of the transmission of plague by fleas harboured in empty bags, a possibility, however, limited to the city and not regarded as extending to transportation to a distance or to foreign commerce.

R. S. J. B.

**NICOLAS (Ch.). A propos de la peste en Nouvelle-Calédonie.**—*Bull. Soc. Path. Exot.* 1915. July. Vol. 8. No. 7. pp. 422–425.

Nicolas has observed three small outbreaks of plague in New Caledonia, the first in October 1913 in the village of Azareu, the second in November 1914 in the village of Nérin and the third in May 1915 in the villages of Azareu and M'Baraoua. The epidemics were strictly limited and, as in the case of the previous observations by the author in Bondé, New Caledonia, no excessive mortality among the rat population was noticed, nor did the malady show any correlation with a diminution or increase in the numbers of these animals. Nicolas concludes that in addition to the rat-flea mode of transmission there must be another mode of conservation and propagation of the plague bacillus.

[It is not stated whether the cases in these epidemics were bubonic, septicaemic or pneumonic; the observations are, in consequence, robbed of a great deal of their interest.]

R. St. J. B.

**LAFONT (A.), LECOMTE (A.) & HECKENROTH (F.). Une observation de méningite cérébro-spinale à Dakar, causée par le bacille de Yersin.**—*Bull. Soc. Path. Exot.* 1915. Mar. Vol. 8. No. 3. pp. 92–96.

In this communication is recorded what appears to be a case of primary cerebro-spinal meningitis due to infection with the bacillus of Yersin. The patient, a native of Dakar, was taken into hospital in an unconscious condition, with marked indications of cerebro-spinal

mischief, and died the following day. At the time of his death there was no suspicion of plague infection. Lumbar puncture was performed on two occasions before death and a thick, ropy, yellow pus was obtained for examination. Microscopically, Gram negative coccobacilli were seen within the leucocytes and in the surrounding fluid, in addition to involution forms strongly suggestive of *Bacillus pestis*. The suspicion aroused by these examinations was confirmed, subsequently, by cultural and animal inoculation tests.

R. St. J. B.

**SHELDON (J. H.). A Note on Plague Bacilli in an Unusual Situation in the Body.**—*Lancet*. 1915. June 19. p. 1294.

The author reports from Insein, Burma, a case of cerebro-spinal meningitis due to *Bacillus pestis*. The patient, an adult Burman male, died after an illness of only 36 hours; convulsions and head retractions being present during the last hour of life. A superficial examination of the body failed to discover any bubo or other gross lesion. "Specimens of peripheral blood were stained with gentian-violet and of the cerebro-spinal fluid with carbolfuchsin, and examination of the slides revealed the presence of typical plague bacilli in small numbers; the slides of the cerebro-spinal fluid simply swarmed with them."

R. St. J. B.

**RUCKER (W. C.). Bubonic Plague. A Menace to American Seaports.** *U.S. Public Health Rep.* 1915. Apr. 16. Vol. 30. No. 16. pp. 1140-1146. With a chart.

This communication is, in substance, a short review of the various plague preventive measures that have been advocated, from time to time, by the U.S. Public Health Service, in relation to port sanitation.

In addition to the rat proofing of docks and water fronts, the importance of carrying such work to a point where all premises occupied by man for domiciliary, mercantile or manufacturing purposes has been rendered proof against the entry of rodents is insisted on. Particulars are given of the various methods of rat proofing structures; special stress being laid on the use of concrete in the ground areas, the stoppage of accidental openings around plumbing and electric wires, the abolition of harbourages in double ceilings and the closure of roof openings by wire gratings.

In conjunction with such measures, the vigorous exclusion of rats from sources of food supply and the destruction of rodents by poisoning and trapping should be systematically carried out.

R. St. J. B.

**CREEL (R. H.). The Migratory Habits of Rats with Special Reference to the Spread of Plague.**—*U.S. Public Health Rep.* 1915. June 4. Vol. 30. No. 23. pp. 1679-1685. With 1 chart.

Some experiments have been recently carried out in New Orleans in relation to the migration of rats from one part of the city to another.

A number of live rats (*Mus norvegicus*) were collected by trapping and, after careful marking, were liberated. On March 28th 179 rats were released in the central residential section of the town; the animals, which were free from plague infection, were marked by punching both ears with a tonsil punch, the resulting mark being quite inconspicuous. On the same day ten rats were found dead within a short distance of the point of liberation and on the following day nine more were picked up. Between 48 and 60 hours from the time of release a half grown *norvegicus* was trapped some 19 blocks away, a distance of about a mile. In the course of its migration the rodent must have travelled across a main avenue (Canal Street), 150 feet in width. The travel was above ground, as there was no sub-surface conduit. Within two weeks a number of rats were recaptured at points four miles distant from the point of release.

On April 8th a second lot of 113 rats were released in the wholesale provision warehouse district of the city, in order to see how far the different character of the territory might affect the migration. This district afforded ample harbourage for rodents, in the way of wooden culverts, drains, etc.; there was also an ample supply of rat pabulum available. As might have been expected, the migration in the second series was very much less marked. Whereas 40 of the 160 rats in the first series made widespread excursions, only 8 in the second series of 113 made any extensive travel.

The practical bearing of these experiments is very apparent. Had the rodents in question been harbouring plague infection in its early stages, it is probable that an epizootic would have resulted by means of a series of "relay" rodents.

Of the first series 103 rats and of the second series 60 were recaptured in 26 days [an eloquent tribute to the zeal and efficiency of the Public Health Service force].

R. St. J. B.

U.S. PUBLIC HEALTH REPORTS. 1915. Mar. 26. Vol. 30. No. 13.  
pp. 891-892. **How Plague may be carried from Place to Place.**

A case of imported rat plague of unusual interest is reported from Seattle, Washington, U.S.A. Some time ago the State Horticulturist of Washington had occasion to open a large box of plants which arrived at the port of Washington from Yokohama, Japan; a rat was found in the soil at the bottom of the box and, on the body of the animal being delivered to the local representative of the Public Health Service, it was ascertained that the rodent was suffering from "chronic" [revolving] plague. Every circumstance pointed to the probability that the infected rat was shipped from Japan; the only alternative being that it entered the box at the appraiser's building at Seattle.

"The Public Health Service has instituted measures looking to the systematic examination of these shipments with the view of determining the relative frequency of such occurrences. When it is remembered that one infected rat is quite sufficient to reproduce the disease in any locality to which it may gain access, the importance of this circumstance can hardly be overestimated."

R. St. J. B.



**WILLOUGHBY (W. M.). Rat Plague and the Powers of a Medical Officer of Health to cope therewith.—*Jl. Roy. Sanit. Inst. Lond.* 1915. Apr. Vol. 36. No. 3. pp. 132–136.**

It is pointed out that although the powers of the Port Sanitary Authority under the Local Government Board orders of 1907, for dealing with ships in which an unusual mortality among the rats has occurred, is very great, the onus of finding if such mortality exists rests with the Sanitary Authority and not with the master or person in charge of the ship. It is suggested that an article should be added to the regulations "throwing a heavy onus on the master, the officer in charge, and the representative of the firm or authority discharging the cargo of any ship from a port infected with rat plague, of notifying forthwith to the medical officer of health for the district in which the ship arrives or is lying any mortality amongst the rats on the ship."

With regard to plague infected areas in the United Kingdom, by Article II of the "Destruction of Rats" order of 1910 the Local Authority shall (1) destroy all the rats in the district ["a large order"] and (2) prevent entrance into buildings and other premises; the expenses incurred to fall on the Port Sanitary Authority [Article IV.]

Objection is taken to the latter regulation on the ground that "where danger to the community arises from or is traceable to the act or default of certain persons, or further, if even arising through them but from circumstances beyond their control these persons, as the introducing agents, should pay for the riddance of that danger. . . ."

In short, the owners or users of the affected area should be called upon to exterminate the rats under the direction of and to the satisfaction of the medical officer of health, and at their own cost."

R. St. J. B.

**HAFFKINE (W. M.). Concerning Inoculation against Plague and Pneumonia and Experimental Study of Therapeutic Methods.—*Indian Med. Gaz.* 1915. Apr. Vol. 50. No. 4. pp. 121–131; May. No. 5. pp. 175–180; June. No. 6. pp. 211–213; and *Jl. of Hygiene.* 1915. July. Vol. 15. No. 1. pp. 64–101.**

In these communications Haffkine has collected together extracts from his evidence before the Indian Plague Commission in 1898, the pronouncements of the Commission in relation thereto, and portions of Sir A. E. WRIGHT's and Drs. W. PARRY MORGAN, L. COLEBROOK and R. W. DODGSON's "Report to the Witwatersrand Native Labour Association on the Results of an Inquiry into the Causation, Prophylaxis and Treatment of the Pneumonia which affects the Native Labourers in the Rand Mines.—Observations on Prophylactic Inoculation against *Pneumococcus* Infections, and on the Results which have been achieved by it."

Two of the members of the Plague Commission, Professor (now Sir) A. E. WRIGHT and Dr. RÜFFER had been initiated by Haffkine in the principles and methods of preventive inoculation, and it would appear from a statement by Sir A. E. WRIGHT that it was largely his views that guided the Plague Commission regarding certain aspects of anti-plague inoculation. In his notes Haffkine has emphasized the points of divergence between the Commission of 1898–99 and himself, which have come within the scope of the inquiry in South Africa above referred to.

The reviews are divided into Parts and Sections. Part I. deals with the prophylactic inoculation against plague and pneumonia and is divided into six sections. Section 1 deals with the question of effectivity of treatment in people who were already harbouring infection in the incubation period in their systems; Section 2 with the extension of treatment to patients in whom infection had progressed beyond the incubation stage and was manifested by morbid symptoms; Section 3 the question of the apparent protection afforded by specific inoculation against "other diseases"; Sections 4 and 5 the procedure for estimating numerically the effects of inoculation. All these sections refer to subjects in which the Indian Plague Commission of 1898-99 dissented from the views expressed by Haffkine, but concerning which Sir A. E. WRIGHT and his co-workers have arrived at results agreeing in the main with Haffkine's conclusions. In the 6th section the author discusses the possibility of racial variation in the receptivity to plague among Indians and Europeans respectively. This question of racial variation has also been emphasized by WRIGHT and his co-workers, as to differences observed in Europeans and Africans respectively in regard to the effects of bacteria on their respective bloods.

Part II. is concerned with experimental studies of curative methods, and contains an epitome of Haffkine's statistical enquiries in relation to his experimental work with Lustig's and other anti-plague sera. The article concludes with a defence of the statistical method of investigation as contrasted with the "experiential method," i.e. the process of taking into account the complex of impressions left, by experience, on the mind of the observer.

R. St. J. B.

CLARK (H. C.). *Note on the Viability of Bacillus pestis in a Cadaver buried in Quicklime.*—*Proc. Med. Assoc. Isthmian Canal Zone.* Oct. 1912 to Mar. 1913. Vol. 5. Pt. 2. pp. 77-79.

In connection with the question of the viability of *Bacillus pestis* in the cadaver, some interesting particulars are reported from Flamenco Island, Panama. During excavation work conducted in that locality, the body of a plague victim, who died on the 23rd June 1909, which was buried in quicklime, was disinterred. The investigation in question was conducted on the 6th March, 1912. The remains were found to be incased in lime, with the exception of the dorsal surface of the body which was in direct apposition to the ground, the bottom of the coffin having disintegrated. The skeleton was practically intact, but no evidence of visceral tissue nor clothing remained. The skull and femur were chosen for bacteriological investigation; agar slopes being smeared with material taken from the inner table of the cranial vault and from the cancellous tissue of the femur. The resulting cultures showed a variety of saprophytic bacteria, yeasts and moulds, but no evidence of the presence of *B. pestis* was forthcoming. Guinea-pigs inoculated with large amounts of culture material remained alive and healthy, showing no evidence of infection during an observation period of six months.

In conclusion it is stated "that material infected with *B. pestis* in as large an amount as the human body could be buried in the manner

mentioned, and disinterred about two years and eight months later with perfect safety. It would seem reasonably certain that the saprophytic organisms had greatly aided the quicklime and that probably the remains could have been removed with equal safety long before the time mentioned."

R. St. J. B.

SWELLENGREBEL (N. H.) & HOESEN (H. W.). **Ueber bei der Diagnose der Rattenpest Schwierigkeiten bereitende Bakterien.** [Bacteria Causing Difficulties in the Diagnosis of Rat Plague.]—*Centralbl. f. Bakt.* 1. Abt. Orig. 1915. Vol. 75. No. 5/6. pp. 456-466. With 2 figs.

The bacteria that produce lesions in rats and other rodents, resembling those commonly associated with infection with *Bacillus pestis*, belong, for the most part, to the Enteritidis of Gaertner and the coli groups of organisms. They are readily distinguished from true plague organisms by means of the usual cultural reactions.

The authors have collected several strains of plague like organisms derived from ship's rats dead with gross pathological lesions resembling those of plague. Four of these strains resembled *Bacillus coli* ("Eemland," "Pyrrhus," "Loppersum" and "Rynland II"), but were easily distinguished by means of their cultural reactions, "Rynland II," for example, being a non indol producer, non gas producer in glycerin and sacchrose, and decolorising mannite, glucose, maltose and laevulose litmus broth. The two remaining strains examined, "Amsterdam" and "Rynland I," showed resemblances to *Bacillus typhi murium* and *Bacillus pseudotuberculosis rodentium*, respectively.

Precipitation experiments showed that any reaction with a serum dilution of less than 1/100 was of no significance. Working with an anti-plague serum from the Pasteur Institute, "Eemland," "Rynland II" and *B. Coli* gave a precipitate with a serum dilution of 1/50, but not with a dilution of 1/100. A strain of true plague ("Medan"), however, gave a significant precipitate with the latter dilution.

R. St. J. B.

## MISCELLANEOUS.

KELLOGG (Vernon L.). **Spider Poison.**—*Jl. Parasit.* 1915. Mar. Vol. 1. No. 3. pp. 107–112.

The author was directed to the subject by the presence in the neighbourhood of Stanford University, California, of the “black widow” spider, *Latrodectes mactans*, which has the reputation of being one of the most poisonous. Of the genus *Latrodectes* one species is *L. maligniatus*, well-known in Southern Europe; another species inhabits New Zealand; in America three species occur—*L. mactans*, which ranges from the northern boundary of the United States to Tierra del Fuego, *L. curacaviensis* from the West Indies and eastern South America, and *L. germeticus*.

Dr. COLEMAN noted the effect of *L. mactans* poison on a patient, on himself, and on cats and rabbits. The account of the patient's case is as follows:—

“Patient B. came to my office one morning at 8.15 o'clock, showing signs of an acute poisoning of some sort.

“The glans of the penis had been bitten by a spider while the patient was sitting in an outcloset. The only thing felt was a sharp sting. (The spider was captured so there is no doubt as to the species; it was a female of *Latrodectes mactans*). In about ten minutes there appeared dizziness and weakness of the legs, followed by cramps in the abdominal muscles.

“The patient left the field where working and started to walk to town, a distance of a little over a mile. The pains grew worse and the penis started to swell and turn red. When the office was reached, the pains of a cramp-like character, in the abdomen, were intense, also around the heart and thighs. Physical examination showed the heart to be running at the rate of 40 per minute, of small volume but regular. The respiration was labored. The pupils were dilated and face very red and congested. The penis was swollen to a great size, fully 3 inches in diameter at the glans, and the colour was a mottled purple. The contractions were clonic in character, giving the greatest pain in the chest and abdomen. There were no pains below the knees or elbows. . . .

“The next morning a fine rash appeared all over the body, accompanied by some itching. The penis had returned to nearly normal in size. The heart-rate was 60, the respiration 18 and deep, temperature 100. The rash disappeared in four days. The patient was troubled with insomnia for several days, and a stubborn constipation that took a very active purge to affect.”

COLEMAN dissected out the poison glands of a female *Latrodectes*, macerated them in distilled water and added milk sugar in such proportion that there was 1/1,000 grain of poison in each grain of powder. He took 2 grain powders every hour for ten doses, with no effect but to decrease the heart's action. On a second occasion he took twenty powders followed by five the next morning. He describes his symptoms thus:—

“The heart-rate was 48, temperature 99, very severe headache, clonic spasms of the thoracic or abdominal muscles, marked distress about the heart with radiating pains extending to the left arm-pit and down to the elbow; had no bowel action for two days; pupils markedly dilated. It seemed a perfect picture of angina pectoris. The symptoms gradually subsided and in three days felt normal. I allowed a period of two weeks to intervene and repeated the experiment with the same symptom-complex picture. The trial was repeated a third time, with always the same results, as to occipital headache, constipation and clonic spasm of the muscles of chest and abdomen; also the pain and distress about the heart.”

The inoculation of a cat with the maceration of the glands of one female *Latrodectes* killed it in ten minutes. A small quantity killed a cat in forty-five minutes. The eggs similarly treated and injected killed a cat in three minutes, and a rabbit in two and a half.

These observations show the deadly character of *Latrodectes* poison, and are confirmed by others. SACHS and KOBERT isolated from the spider's body a specific poisonous principle called arachnolysin, which is a powerful haemolysin as shown in the case of rabbits, rats, mice, geese and man. A diadem spider of 1·4 grains contained sufficient poison to destroy completely all the corpuscles in 2·5 litres of (drawn) rabbit blood. KOBERT distinguishes between the actual secretion of the poison glands and a toxalbumen which exists everywhere throughout the body of the spider, especially in the legs and eggs.

A. G. B.

WILSON (A. H.). **Notes of Two Cases of *Porocephalus armillatus* Infection occurring in Man.**—*S. Nigeria Ann. Med. Rep. for the Year ending Dec. 31st, 1913.* 1915. London: Printed by Waterlow & Sons, Ltd. pp. 71–73.

The first case was that of a Kroo-boy aged about 18, admitted to hospital at Degema, Southern Nigeria, on June 7th with ulceration of the cornea. "It was noticed that his general condition while in hospital was one of gradual and progressive asthenia, and within two weeks of his death his gait became staggering, reflexes were lost, and there were some vague pains about the legs." The heart's action was rapid, there was no murmur and no signs of cardiac incompetency. Death took place on July 14th. At the post-mortem the pericardium was found to be generally adherent, the right ventricle was found dilated, the left ventricle normal. The liver was slightly enlarged and nutmeg in appearance; on the surface were two "cicatrical-looking patches" which were found to be encysted larvae of *Porocephalus*; on further search ten more were found in the liver and one in the mesentery. None were to be found in the lung. Death was attributed to *Porocephalus* infection accelerated by pericardial disease.

Case 2 was that of a man aged about 50, first admitted to hospital on April 7th. Asthenia was progressive, so that he could only walk a few yards. The week before his death his abdomen became swollen and later the feet and legs. On September 11th there were signs of congestion of the lung and two days later he died. Post-mortem, a large amount of fluid was found in the peritoneal cavity, the lungs were oedematous and congested, the liver was tough and showed numerous cicatrical patches. Five liver cysts were found; nothing in the mesentery or lungs. The diagnosis was *Porocephalus armillatus* infection accelerated by congestion of the lungs. [For recent papers on this subject, see this *Bulletin*, Vol. 3, p. 276 and Vol. 4, p. 531.]

A. G. B.

**PENSCHKE.** *Prophylaxe gegen Sandflöhe.*—*Arch. f. Schiffs- u. Trop. Hyg.* 1915. Mar. Vol. 19. No. 5. pp. 150-151.

SOMMERFELD recommends as a preventive against chigoes the following—15 drops of lysol or cresol soap solution well mixed with 100 grams of vaselin. This is rubbed into the feet after they have been washed. In strongly infested places this measure has protected for three days. Chigoes which have penetrated before it was used die and can be more easily extracted than when alive. This process was reported on from various parts of German East Africa, but not always favourably. The author thinks it can be recommended.

A. G. B.

de MAGALHÃES (José Augusto), *A reacção local á picada do mosquito será um elemento de defesa?* [Is the Local Reaction in a Mosquito-Bite an Element of Protection?].—*Brazil Med.* 1915. Jan. 15. Vol. 29. No. 3. pp. 20-21.

The author propounds the theory that individuals who react severely to mosquito bites are much less likely to develop malaria afterwards than those in whom the bite causes little or no local irritation. Clinical facts in his experience can be adduced to support this view.

J. B. Nias.

**HERMANT.** *Avantages de la Rachianesthésie en Chirurgie tropicale.*—*Far East. Assoc. Trop. Med. C. R. Trois. Congrès Biennal, Saigon (1913).* 1914. pp. 454-457.

Anaesthesia is a great cause of anxiety to anyone who has to operate in the tropics. The anaesthetist is often not expert; changes in the liver, so frequent in tropical countries, add to the dangers of chloroform and even ether; and shock is to be feared. Spinal anaesthesia avoids these difficulties; it seems to be free from danger if it is limited to operations below the diaphragm. It is easy to carry out. It makes the operator master of his anaesthesia and takes away all pre-occupation. As to the seat of the puncture, the dorsolumbar space should be chosen. Attention should be paid to the position of the patient, on which depends the extent of the anaesthesia. It is good practice to let 10 cc. of the cerebro-spinal fluid run away before injecting. The author has used successfully stova-cocaine, stovaine, cocaine, novocaine, tropacaine, and stovaine with strychnine. In every case he has given a previous injection of scopolamine-morphine ( $\frac{1}{4}$  mgm. of scopolamine + 1 cgm. of morphine). Anaesthesia has lasted longest with cocaine. Unfortunately with this substance there is sometimes vomiting and other symptoms, less frequent if coffee is given before the operation. These symptoms disappear completely if one replaces the scopolamine-morphine by a similar injection of sparteine strychnine (5 cgm. sparteine and 2 mgm. strychnine) given at the same time as the puncture. In default of cocaine JONNESCO's stovaine-strychnine method seems good.

With this form of anaesthesia the author has operated upon hepatic abscesses, appendicitis, ovarian cysts, strangulated hernias, etc. He is uncertain about the harmlessness of high puncture in the cervical dorsal region, and cites a case in which sudden death followed.

A. G. B.

**MASSEY (A. Yale). Spinal Analgesia in Native Practice.—*Jl. Trop. Med. & Hyg.* 1915. Apr. 15. Vol. 18. No. 8. pp. 87–88.**

For more than three years Dr. Massey, who writes from Lusambo, Belgian Congo, has been employing stovaine injected into the spinal theca for all operations below the umbilicus. To the objections to general anaesthesia mentioned by HERMANT he adds the dread which the native has of losing consciousness. He punctures between the third and fourth or second and third lumbar spines, and prefers a long hollow needle of steel, as less liable to bend or break than platino-iridium. He describes his technique. He finds it advisable first to puncture the skin with a sharp scalpel. He uses for an adult 5 cgm. of stovaine in a cubic centimetre of fluid. This is contained in ampoules which may be had from James Flach, 16, Water Lane, London, the agent for Paulenc Frères, of Paris; they keep well. Or the solution may be made after Krönig's formula:—

Stovaine..	..	..	..	0.04 gm.
Chloride of sodium	..	..	..	0.0011 gm.
Distilled water	..	..	..	1 cc.

The anaesthesia continues for about an hour.

The author cannot too strongly recommend the method.

A. G. B.

**CRAIG (Charles F.). The Importance of Tropical Diseases to the American Practitioner, as Illustrated by their Occurrence in the United States.—*Amer. Jl. Trop. Dis. & Prevent. Med.* 1915. July. Vol. 3. No. 1. pp. 5–16.**

The writer points out that diseases once thought to be largely limited to the tropics have invaded temperate zones, and this process is likely to be accelerated as regards the United States by the opening of the Panama Canal. In this paper he calls attention to the occurrence of many so-called tropical diseases in the U.S.A.

**Malarial fever.** Estivo-autumnal malaria before the Spanish-American war was confined to the Southern States. Soon after the commencement of this war soldiers invalided home from Cuba and the Philippines introduced this type of infection into many hitherto free localities, and in some of these the severe forms of malarial fever are now endemic. They were at first unrecognised or diagnosed as typhoid or some other form of continued fever, with disastrous results. A personal experience of the kind is given from Connecticut.

**Relapsing fever.** This has occurred constantly since it was first recognised in 1844. It is due to *Spirochaeta novyi*. The author writes: "It is more than probable that even at the present time,

numerous cases of this disease occur which are not diagnosed, being mistaken for malaria, typhoid, or some other form of fever." He notes how few physicians ever make a microscopical examination of the blood in fever.

*Dengue* occurs commonly in the Southern States. It is noted that no effort appears to have been made to determine the period of infectiveness of the blood nor how long the mosquito may transmit the disease, in addition to other important points, in spite of the many opportunities for investigation.

*Blackwater fever* occurs in many of the Southern States and is always associated with the more severe forms of malarial infection. However, there has never been a really scientific study of blackwater fever made in the United States.

*Undulant fever* is known to be endemic in Texas. It is believed that "this fever occurs in many of our larger cities and is constantly being mistaken for typhoid, acute or chronic arthritis, malaria or some other febrile conditions."

*Beriberi* occurs not infrequently in the United States, but is generally unrecognised. Owing to the fact that the dietary of the American is usually balanced and varied it is of comparatively rare occurrence.

*Bacillary dysentery* is endemic and frequently occurs in the form of fatal epidemics especially among young children. Many such deaths could be avoided if the condition was recognised in time.

*Amoebic dysentery* is now known to have a world-wide distribution. Tropical dysentery, as it is often called, is a misnomer. The writer has personally observed cases originating in 16 states of the Union.

"Of 1,700 patients whose faeces were examined [at Rochester, Minnesota] during the past two and a half years, no less than 79 showed infections with *Endamoeba histolytica*, of which 42, or more than one-half, were infected in the Northern States, the remainder being from the more Southern States of the Union. Of the infections acquired in the Northern States, 14 were acquired in Minnesota, 12 in Iowa, 5 in North Dakota, 5 in South Dakota, 2 in Nebraska, 2 in Wisconsin, and 2 in Montana."

He draws attention to the importance of the discovery of "carriers" of this infection.

Amoebic abscess of the liver has frequently originated in the United States.

*Leprosy*. This disease often goes long unrecognised. Some years ago a case of leprosy was discovered in a servant to the interns in one of the large hospitals in U.S.A. For over a year he had suffered from a tubercular eruption on the face which was undiagnosed, till a physician recently returned from the Philippines remarked its resemblance to leprosy, when the bacillus was forthwith found.

Of animal parasites *Paragonimus westermanni* is endemic in hogs and human cases have been reported. *Clonorchis sinensis* has been reported in over 20 instances as well as cases of infection with *Dicrocoelium lanceolatum*, *Fasciola hepatica* and *Schistosoma haematobium*. *Hymenolepis nana* is widely distributed. Infections with *Filaria bancrofti* have been found as far north as New York City.

In the author's opinion a thorough knowledge of the subject of "tropical diseases" is absolutely essential to the conscientious American physician, and this knowledge must be based upon actual laboratory work and a study of clinical cases.



**van LOGHEM (J. J.).** *Verslag van een Hygienische Informatie-Reis naar Egypte, Tor, Jeruzalem, Tunis en Algerije.* [Report of a Sanitary Tour in Egypt, El Tor, Jerusalem, Tunis and Algeria.]—*Koloniaal Instituut te Amsterdam, Mededeeling No. 3. Afdeling Tropische Hygiene. No. 1.* viii + 142 pp. With 14 plates and various figs. 1914. Amsterdam: J. H. de Bussy.

This is the report of a two-months' tour made by the author at the end of the year 1913, on behalf of the Amsterdam Colonial Institute, for the purpose of collecting information as to the latest methods of dealing administratively with infectious diseases in the localities mentioned in the title. The author found time to visit in succession Alexandria, Cairo, Ismailia, Suez, El Tor (the Egyptian pilgrim quarantine station on the Red Sea), Jerusalem, Port Said, Algiers and Tunis. At all these places observations were made on the existing machinery for dealing with infectious diseases, purification of water-supply and so on, the result being the collection of a very instructive body of facts. To the general reader, perhaps, the most interesting section will be that on the pilgrim quarantine station at El Tor, where all persons returning from Mecca to European or Mediterranean countries are examined, disinfected and quarantined before being allowed to return to their homes. The research work done at this station receives due commendation. The account given of malaria prevention at Ismailia, Jerusalem, and in Algeria is also very good. Incidentally the author points out the exceptionally heavy toll taken of the adult male population in Mohammedan countries by the Mecca pilgrimage system. In the year 1912, out of 18,000 odd pilgrims from the Dutch East Indies alone, 2,600, in round numbers, died, being 14 per cent. This was a cholera year, but in the following year, when there was no cholera, the mortality was again 12 per cent., dysentery being apparently the principal cause of death. The illustrations given are both numerous and good, and altogether the author may be congratulated on having made a most excellent use of the time at his disposal.

J. B. N.

**GABBI (Umberto) & Others.** *Le Malattie Tropicali dell'Italia Meridionale, della Sicilia e della Libia, etc.*—28 pp. With 4 maps. 1915. Roma: Tipografia Nazionale di G. Bertero e C.

This is an exhaustive catalogue of memoirs on the subject of the tropical diseases of Italy and its dependencies, which have appeared under the superintendence of Professor Gabbi between the years 1606 and 1914. It forms a useful work of reference.

J. B. N.

**CLARK (H. C.).** *Incidence of Lithiasis at Ancon.*—*Proc. Med. Assoc. Isthmian Canal Zone for the Half Year Oct. 1912 to Mar. 1913.* Vol. 5. Pt. 2. pp. 7-14.

The labour employed by the Isthmian Canal Commission is chiefly drawn from the negro population of the West Indies. The author, after making 1,500 consecutive post-mortems at Ancon hospital, thought it of interest to determine the frequency of calculi of various types. Thirty-nine instances of biliary calculi were found—24 among 4,088 West Indian negroes, 9 among 230 Spanish Indians, and 3 among

108 Spanish. In nearly all the cases malarial pigment was present in spleen, liver and marrow and it is suggested that inspissation of the bile, a marked feature in malarial haemoglobinuria, may be an etiological factor. Eight cases of stone in the kidney or bladder were noted, and two cases of pancreatic calculi.

The summary is as follows:—

"(1). The findings at this hospital indicate a much less frequent occurrence of biliary calculi in the negro than in the white race living in the temperate zone, but they tend also to show a much greater incidence in the negro of the tropics than in his brother of the temperate zone.

"(2). Suggestive factors relative to etiology are the prevalence of enteritis, colitis, and malaria, especially the intestinal diseases.

"(3). Ancon Hospital findings would also indicate a higher percentage of cholelithiasis among the Old World Spaniards than authorities are willing to grant.

"(4). Calculi of the urinary passages in the negro would appear to be extremely rare."

[It is worth noting that in an examination of 281 bodies, 247 of which were Indian or European, at Calcutta in 1913 in only four instances were biliary calculi found (FOSTER).]

A. G. B.

CLARK (H. C.). **Observations in Tropical Pathology. II. Three frequently Silent Lesions: Gastroduodenal Ulcers, Gall-Stones and Pancreatitis. Their Relative Incidence in Panama Canal Laborers as disclosed by Autopsy.**—*Amer. Jl. Trop. Dis. & Prevent. Med.* 1915. Mar. Vol. 2. No. 9. pp. 556-571.

This analysis relates to 2,100 autopsies of persons, nearly all young male West Indian negroes, who had spent their lives on the islands and on the Isthmus of Panama and were thought to be in good physical condition at the time they were recruited for service on the Panama Canal Zone. Practically all were outdoor labourers. The following table shows the race, sex and age incidence:—

	Gastro- duodenal ulcers.	Gallstones.	Pan- creatitis.	Total individuals autopsied.
West Indian negroes ..	82	49	8	1,598
Latin Americans (mestizo)	7	15	1	274
White race .. ..	5	8	2	222
Yellow race .. ..	1	0	0	6
Totals .. ..	95	72	11	2,100
Males .. ..	82	52	9	1,743
Females .. ..	13	20	2	357
Totals .. ..	95	72	11	2,100
Under 30 years of age ..	37	21	6	1,132
30 years to 40 years ..	26	20	2	481
41 years to 50 years ..	19	12	2	296
51 years to 60 years ..	10	11	1	123
61 years to 70 years ..	3	5	0	46
Over 70 years .. ..	0	3	0	22
Totals .. ..	95	72	11	2,100

In his conclusions the author makes the following remarks : —

"It is surprising to find so many of these conditions occurring in an apparently healthy young adult male negro population. . . .

"The result of the analysis shows that gastro-duodenal ulcers rank first in order of frequency when both acute and chronic lesions are considered, and that chronic peptic ulcers occurred with the same frequency as gall-stones. Pancreatic disease, either local or general, was rarely encountered and then usually as a result of gall-stone or ulcer associations which acted as etiological factors.

"There was a coincident occurrence of two or more members of the trio in twenty-one of the individuals ; gall-stones and ulcers of the duodenum or the stomach occurring together in 14 cases ; gall-stones and pancreatitis in two cases ; gall-stones and ulcers and pancreatitis in one case ; ulcers and pancreatitis in four cases.

"It is plausible to believe that gall-stones and gastro-duodenal ulcers may at times be predisposing factors, one to the other, and it is certainly true that gall-stones and duodenal ulcers may at times produce pancreatitis.

"Clinical evidence has been offered in 19 of the cases of gastro-duodenal lesions ; in 12 of the gall-stone cases, and in only one of the cases showing pancreatic disturbance." . . .

"It is reasonably safe to conclude that there is no other anatomical region of equal size in which there are so many closely related viscera that frequently harbor latent lesions capable of masquerading under so many deceptive clinical pictures, and the negro race must be kept in mind as victims of these three conditions when a differential diagnosis of an obscure condition in the upper abdomen is being considered."

A. G. B.

**SCOTT (H. H.). Reports on Vomiting Sickness.**— 24 pp. 1915. Jamaica : Government Printing Office, Kingston.

This brochure contains two reports dated March 10th and June 6th, 1915, respectively. In February the author proceeded to the Montego Bay district of Jamaica to investigate an outbreak of vomiting sickness. He remained there for three days, saw several patients and performed five autopsies. He either saw or obtained detailed histories of 35 cases, 32 of which he regarded as genuine vomiting sickness. Details of the cases follow with an account of the food previously taken. Discussing these the author says that in 16 there was a definite history of eating ackees, or the water in which they had been boiled, at the meal preceding the onset of the illness. In six other cases ackees had probably been taken and in seven no history of eating ackees could be obtained, but "it must be noted that in every instance trees bearing ripe fruit were growing in the yard in which the huts were situated, and amongst the poor people it would be most unlikely that the use of a food which was ready to hand . . . would be avoided." He also notes that "salt-fish" was frequently named as an article of diet and it afterwards came to his knowledge that among these people "salt-fish" often means salted ackee.

People in Jamaica are convinced that ackees under certain conditions are poisonous, especially those which are gathered unopened or those which have been forced after falling unopened. An adult native is suspicious of such a fruit ; children naturally would not be, hence the great incidence amongst children. It appears that the poison is extracted by boiling the affected fruit with water ; in such cases the parents eat the ackees and the children get the pot water.

The author obtained some ackees which appeared good except for the fact that they were unopened or had been forced open after being

gathered. These were boiled with water and the extract was used for administration to animals, namely three kittens and one puppy. Full details of these experiments are given and of the post-mortem examinations. Of the symptoms of the animals the author writes :—

“ They were all previously in good health and well nourished as are in my experience the majority of vomiting sickness subjects ; after taking the ackee extract an interval elapses (two hours in the human, one to one and a quarter in the animal) during which there are no symptoms of any importance ; this I regard as the interval during which absorption is taking place. Then, sudden vomiting occurs with recovery in a few instances (the poison being got rid of), or subsequent drowsiness, somnolence, and coma terminating in death (from cerebral and generalised action of the absorbed poison) ; or, in rarer instances still, the cerebral symptoms (drowsiness, coma) come on without any preceding vomiting—the so called ‘ vomiting sickness without vomiting.’ One symptom—convulsions—I did not see in the animal experiments, but it must be remembered that they are not always present in human cases of vomiting sickness either.”

The conditions found post-mortem in these animals have all been reported in cases of human vomiting sickness. The histological findings are the same. The author gives a list of the points which a theory of the causation of vomiting sickness will have to satisfy. They are as follows :—

- “ (1). *Peculiar Seasonal Prevalence.*
- “ (2). *Its confinement to Jamaica so far as is known.*
- “ (3). *Sudden onset of symptoms in apparent good health, and in the well nourished as in the emaciated.*
- “ (4). *The rapid and complete recovery of non fatal cases.*
- “ (5). *Affection of several members in one house or close neighbours in a settlement.*
- “ (6). *Its vastly greater preponderance in children.*
- “ (7). *No preference as regards sex.*
- “ (8). *While children practically never attacked, East Indians rarely.*
- “ (9). *The Pathological changes set up.*

The ackee theory, he says, appears to meet all these. The disease corresponds exactly with the main ackee season ; it is limited to Jamaica and ackees appear not to grow “ at all events to any extent ” in the other islands. Finally, he states that hitherto unexplained points are all met by the view that the condition is an acute intoxication by a hot aqueous extract of unopened or unwholesome ackees.

[In reply to a query Mr. Edmund BAKER, of the British Museum (Natural History), writes as follows :—“ The akee plant is *Blighia sapida*, Koenig. It is only naturalised in Jamaica. It came from West Africa, Guinea, Ashanti, and Princes Island. It belongs to N. O. Sapindaceae. The seeds are hard and black, as large as a cherry with a prominent white arillus enveloping the lower half.”

In 1906 Dr. C. W. BRANCH in a paper on vomiting sickness\* referred to the fruit of the akee tree as containing a poisonous principle. Ackee poisoning was discussed by Captain T. J. POTTER, R.A.M.C. [1912] in a report on vomiting sickness [see this *Bulletin*, Vol. 2, p. 105] ; he was unable to find any record of death from undoubted ackee poisoning. Further investigation will show whether Dr. Scott's view is correct. It will be necessary, as he says, to find out whether cases

\**Journal of Tropical Medicine and Hygiene.* 1906. Dec. 15. Vol. 9, pp. 374–375.

occur in parts where no ackees are obtainable, and similar enquiries should be made in West Africa, whence the tree comes. It is somewhat remarkable that the natives should not have discovered the cause of the disease if symptoms follow so promptly on ackee consumption.]

A. G. B.

BAILEY (W. F.). *A Case of Uta Venomosa.*—*Amer. Jl. Trop. Dis. & Prevent. Med.* 1915. Feb. Vol. 2. No. 8. p. 530. With 1 plate.

This brief report runs as follows :—

"*History of Case.*—Male, 43 years of age. Two years ago, while in the interior of Peru, this man was bitten by a small fly, which the Indians call '*l'ta venomosa*' (or poisonous fly), a little, white, fuzzy thing no larger than a pin head. When it bites, the next day a very small blister appears, with a watery discharge. This man was bitten just above the right eye. That eye was eaten away, also his nose; his right hand is in the same condition, as well as his right foot; his face is a mass of pus, underneath. The flesh is a bright pink. There is no pain, but a very disagreeable odor.

"This disease is found only in Huancayo, Peru, and 45 leagues from there to the interior. When the Indians are bitten they apply gunpowder on the bite and set fire to it, with very good results. This is the only case of a white man ever known as having this disease in Peru."

A photograph shows that one eye and half the nose have disappeared, leaving in the latter situation a cavity, with ulceration or scarring or both over a considerable portion of the face. There is no information as to the presence or absence of a general infection such as syphilis.

A. G. B.

ARCHIBALD (R. G.). *Notes on the Case of No. 7560, Serjeant C. S., 1st Battalion, the Suffolk Regiment.*—*Jl. R. Army Med. Corps.* 1915. Feb. Vol. 24. No. 2. pp. 185–189. With 3 plates.

The patient had been stationed in Khartoum since January 1914; he had previously served in Alexandria. He was admitted to the hospital on September 24th, 1914. He had noted swelling in his legs two months before. On admission his temperature was 103°. He had symptoms of multiple peripheral neuritis in the legs and some signs of it in his upper limbs; knee jerks were absent. There were anaesthetic areas over the calves in both legs and in the tips of the fingers. Foot drop was present. The heart was disordered in action—rate 120. The calves were tender. The disease was thought to be alcoholic neuritis with disordered action of the heart due to nicotine. On October 6th oedema of the legs and back was noted; on October 12th, paresis; on October 13th the tongue became excessively swollen and was incised. On October 14th he died. Portions of the organs were sent to the Wellcome Tropical Research Laboratory. A detailed account is given of what was found in the sectioned specimens.

The following remarks are made :—

"From the examination of the material obtained there can be no doubt that a systematic infection with a fungus was present, and *ipso facto* it was the *causa causans* of the patient's malady.

"The microscopical evidence tends to show that the infection was obtained via the intestinal tract, and that the initial lesion commenced in the ileum in the form of an ulceration set up by the presence of a fungus.

"The photomicrographs illustrate (a) the fungus *in situ* in the intestinal lesions; (b) a mycelium and spores of the fungus in the liver; (c) spores of the fungus in the blood vessels supplying the sciatic and posterior tibial nerve.

"Such evidence is sufficiently conclusive to warrant the diagnosis of a 'mycosis' being made.

"Unfortunately, as the condition was not suspected, neither culture nor animal experiments were carried out to determine the species of fungus present, consequently it was only possible to determine the fungus somewhat arbitrarily from its morphology as seen in the tissues, and more especially in the intestinal lesions. In the latter it appeared to possess characters which would allocate it either to the genus *Endomyces* or the genus *Sporotrichum*."

The author remarks that the evidence obtained points to an alimentary infection caused by the ingestion of food or water containing the fungus. The genus *Sporotrichum* has been found saprophytic on lettuces. The case is the first in the Sudan in which evidence has been obtained of systemic infection with a fungus. The marked clinical similarity to beriberi is noted; the lesions present in the sciatic and posterior tibial nerves were identical with those found in beriberi. The author thinks that more research is required to exclude the theory that beriberi is caused by some vegetable parasite.

Nine excellent photomicrographs illustrate the paper.

A. G. B.

MASSAGLIA (Aldo). *L'epidemia di ittero infettivo a Tripoli nell'anno 1912*. [The Epidemic of Infective Icterus at Tripoli in 1912.]—*Malaria e Malat. d. Paesi Caldi*. 1915. May-June. Vol. 6. No. 3. pp. 134-143.

The scope of this paper is less extensive than its title would imply, as it merely gives an account of the symptoms in three patients who came under the author's care in a Red Cross hospital. All three recovered, and from want of the necessary strains of laboratory bacilli it was not possible to test their serum reactions in anything like a satisfactory manner. Nothing but ordinary *B. coli* could be isolated from the stools. The epidemic of which these cases formed part has been reported on by RIZZUTI and SCORDO in a Government publication.

J. B. N.

i. CLARKE (J. T.). *Rheumatic Fever and Rheumatoid Arthritis: The Geographical Factor*.—*Lancet*. 1915. June 5. pp. 1169-1171.

ii. BAETZ (Walter G. F.). *One Hundred Cases of Acute Arthritis among Negro Laborers on the Panama Canal*.—*Proc. Med. Assoc. Isthmian Canal Zone for the Half Year Oct. 1912 to Mar. 1913*. Vol. 5. Pt. 2. pp. 61-70.

i. The author, who writes from Perak, Federated Malay States, points out that there is no rheumatic fever in the Malay Peninsula and it is extremely probable that the disease does not occur in any part of the tropics, at least at or near sea-level. The disease appears to be common in Egypt, which is hot but not tropical. In the course of eighteen years in the Malay peninsula he has never seen a heart with rheumatic lesions of the valves, nor has he met with chorea. Major BUCHANAN, I.M.S. and Mr. CANTLIE are quoted as to the

absence of rheumatic fever from the tropics, and a table is given from FOSTER\* which shows that no lesions of the valves were found in 281 post-mortems at the Calcutta Morgue in 1913.

ii. Some of the most noted authorities in tropical medicine declare, the author writes, that acute articular rheumatism is practically non-existent among natives in the tropics. Hence the study described in the title. Traumatic arthritis, arthritis occurring during the course of pyogenic infections, and that frequently seen in disseminated tuberculosis were excluded. The cases were admitted to hospital in the course of twelve months. The majority came from the West Indies, a few from Central or South America. The diagnosis made on discharge was as follows:—

Syphilitic arthritis	..	..	..	63
Gonorrhoeal „	..	..	..	28
Undetermined „	..	..	..	6
Dysenteric „	..	..	..	2
Tubercular „	..	..	..	1

100

With regard to the large number of cases ascribed to syphilis, the author states that clinical observations were corroborated by Wassermann tests, followed by the old therapeutic test of mercury and iodides, and occasionally by salvarsan.

“Objection may here be raised as to the validity of the Wassermann test in as highly a malarial region as ours, since it has been claimed that this test is frequently positive in malaria. That this conception is a fallacy has been amply proved in a paper by Doctor Bates, entitled “The Wassermann Test in the Tropics,” read before the annual meeting of the American Medical Association, last June.”†

There follows a description of the symptoms.

“The average case is admitted to the ward with a multiple, rather subacute arthritis. A genital scar is frequently found. As a rule there is no fever and the joint pain is only severe on pressure. The joints usually involved are the knees, elbows, sterno-clavicular, ankle, and wrist. The finger and toe joints are seldom affected. There is moderate swelling but marked effusion is rare. The involvement of the periarticular bursae and of the tendon sheaths is very rare. In other words, the inflammation is limited to the joint, the latter being simply boggy and tender to pressure. . . . The most reliable concomitant sign of syphilitic arthritis was acute osteoperiostitis of the sternum and of the long bones, especially of the posterior surface of the tibia. The patient is usually very sensitive to even moderate pressure when this exists. . . . The cases, with few exceptions, probably belong to the late secondary stage.”

Details of the treatment are given.

In the case of gonorrhoeal arthritis the clinical picture is quite different. The temperature is generally raised, pain and tenderness are much more marked, the joints are frequently distended with fluid, and inflammation often extends to the periarticular bursae and tendon sheaths.

\* *Indian Medical Gazette*. 1915. Vol. 50. p. 15.

† *Archives of Internal Medicine*. 1912. Nov. Vol. 10. pp. 470–477.

The summary is as follows:—

"Ninety-one per cent. of the acute arthritis of the series admitted to the male negro medical wards during the past year, were caused by venereal disease. Sixty-three per cent. were of syphilitic etiology, the Wassermann test being positive in 93·6 per cent. of these cases. An intensive mixed treatment, carried to the point of maximum tolerance, has enabled these men to return to work temporarily, in an average of 18·8 days per man.

"Twenty-eight per cent. were of gonorrheal origin. Vaccine treatment gave very good results, sometimes brilliant ones, in the great majority of cases. Unfavourable results due to the treatment were not noticed. The average number of days under treatment per man was 24.

"All other types of arthritis were in such minority that they are practically negligible.

"Acute articular rheumatism was not encountered and acute or chronic endocarditis was not recognised in any of the total 100 cases."

A. G. B.

**PYMAN (Frank Lee). Some Interesting Drugs of Tropical Origin.—**

*Trans. Soc. Trop. Med. & Hyg.* 1915. Apr. Vol. 8. No. 6. pp. 167–193.

The drugs of tropical origin dealt with by Dr. Pyman were ipecacuanha, cinchona, coca, jalap and scammony, camphor, rhubarb, *Combretum sundiaccum* (the anti-opium plant), Chaulmoogra oil, gurjun oil, thymol and carvacrol, oil of chenopodium, santonin, gum acacia, senna, *Calotropis procera*, strophanthus, and physostigmine. In each case are given, the history of the discovery and introduction of the drug, where found, method of collecting, chemical constitution, etc. Only a few points can be touched on here.

Emetine and cephaelin are derived from iso-quinoline, the parent compound of the alkaloids of opiums. Reference is made to MARKHAM CARTER (1914), who found that "the true emetine amebacidal effect is delayed in patients who are confirmed opium eaters and . . . from the slaves of opium we get our cases of rapidly fatal, acute, gangrenous dysentery." Pyman suggests that in the case of opium eaters the amoebae have developed a tolerance to certain "pharmacophore" groups common to emetine and some of the opium alkaloids.

The section on cinchona is of special interest. The following table shows the quantity of the four crystallizable alkaloids and of the amorphous alkaloid, quinoidine, contained in "cinchona febrifuge" and "residual alkaloid," both amorphous mixtures of bases, respectively. "Residual alkaloid" is the residue left after the extraction of the quinine. "Cinchona febrifuge" is obtained from a species which contains only a small proportion of quinine. "Quinoidine" is the residue obtained when no more alkaloids can be extracted.

			"Cinchona febrifuge."	"Residual alkaloid."
Quinine .. ..	..	..	7 per cent.	3 per cent.
Cinchonidine ..	..	..	6 "	2 "
Quinidine .. ..	..	..	23 "	20 "
Cinchonine .. ..	..	..	19 "	35 "
"Quinoidine" ..	..	..	29 "	30 "
Water, etc. ..	..	..	16 "	10 "
			100 per cent.	100 per cent.



All the preparations named have been employed in malaria. MacGILCHRIST suggests that cinchonine is superior to the other crystallizable alkaloids. The author writes :—

In comparing the two classes, (a) the four crystalline alkaloids, quinine, quinidine, cinchonine, and cinchonidine, and (b) the three amorphous preparations, "cinchona febrifuge," "residual alkaloid," and "quinoidine," three chief differences may be noted :—

"1. The former are employed as salts, whilst the latter are used as bases. It is possible that the use of the latter as bases may be responsible for the accompanying nausea ; and it would be interesting to learn whether the salts of the three amorphous alkaloidal preparations were also liable to cause this effect.

"2. The former are crystalline, the latter amorphous. This may well affect the rate of absorption.

"3. The former are simple substances, whilst the latter are mixtures."

He recalls recent work on the synergism of the opium alkaloids ; e.g. morphia mixed with narcotine in certain properties is more active than when pure, although the action of narcotine alone is much slighter than that of morphine.

Chaulmoogra oil is the fatty oil expressed from the seeds of *Taraktogenos kurzii*, King, a large tree indigenous to Burma and Assam. Similar oils are obtained from *Hydnocarpus wightiana*, Blume and *H. anthelmintica*, Pierre, which have a reputation in India and China as remedies in leprosy. These three oils are physically and chemically nearly identical. It is not known whether the two last-named are really inferior to that of *Taraktogenos*.

Oil of chenopodium, or American worm-seed oil, is distilled from a weed ; its active principle is ascaridol. SCHUFFNER and VERVOORT found it superior to any other vermifuge in the treatment of 1,457 cases of hook-worm disease.

The author concluded with an appeal for the collection of information with regard to native remedies, stating that (1) in the case of such as seem worth investigation a quantity of not less than seven pounds is desirable ; (2) the plant should be accessible in quantity ; (3) a specimen of its parts should be procured to permit of botanical identification ; (4) confirmation of its action in disease should, if possible, be obtained from competent observers.

A. G. B.

YOUNG (W. J.). **The Metabolism of White Races living in the Tropics.**

1. **The Protein Metabolism.**—*Ann. Trop. Med. & Parasit.* 1915. Mar. 18. Vol. 9. No. 1. pp. 91–108.

Reference is made to the work of EIJKMAN, McCAY and others. In this enquiry, conducted at the Biochemical Laboratory, Australian Institute of Tropical Medicine, fairly complete analyses were made of the daily urine of four male subjects between 25 and 36, who had resided in tropical Queensland from one to four years. They were not restricted in their diet. The methods are detailed and the results set forth in tables. The observations bore on the volume, specific gravity and total nitrogen ; the urea ; the ammonia ; the creatinine and creatine (the latter was only present on one occasion) ; the uric acid, purin bases, phosphoric acid, chlorides and sulphur. The conclusions reached are that, as far as the experiments go, no marked variations are shown from the averages obtained in temperate climates. For the details the paper should be consulted.

A. G. B.

## BOOK REVIEWS.

McCLURE (J. Campbell), [M.D. (Glasgow).]. **A Handbook of Fevers.**—viii + 470 pp. with 27 charts, 1914, London: Shaw & Sons. [Price not stated.]

In the preface to this interesting volume the author states that it is for the use of students and general practitioners and that attention is confined as much as possible to the practical aspects of the diseases; "only such points in epidemiology and bacteriology have been dwelt upon as seem to be absolutely necessary." Each specific fever is considered in turn under the headings, Definition, Incubation, Rash, Clinical types, Diagnosis, Complications and Sequelae, Treatment, Diet, Epidemiology and Method of Infection, Home Prophylaxis, and Public Health Administration.

As will be seen in the course of this review, in a journal for tropical practitioners it is thought necessary to comment on statements which in a home medical journal might pass muster.

After an introductory chapter on fevers in general the book is divided into (1) Fevers of Known Bacteriology, amongst which plague, cholera, relapsing fever, malaria, dysentery and kala azar, and to a less extent enteric fever, are of interest to readers of this *Bulletin*; (2) Fevers of Uncertain Bacteriology, including typhus, yellow fever and smallpox; and (3) Acute Diseases frequently attributed to a Diet consisting largely of certain Cereals—beriberi and pellagra. It is difficult to see why beriberi and pellagra find a place in a book on fevers, whereas undulant fever does not.

In the first chapter the author expresses himself against antipyretic drugs. If fever cannot be reduced by external applications of tepid, cold, or iced water it is improbable that any drug will succeed without jeopardising the life of the patient. He advises that a due proportion of as much soluble carbohydrate as can be tolerated be added to the nitrogenous food which is given to prevent tissue wasting, so as to ensure a proper utilisation of the latter. As to alcohol, "used with discretion and in moderation, it is often of the greatest service"; more than two to four ounces in the day is rarely necessary.

In the chapter on relapsing fever two clinical types are described—the European and Indian type and the African type. The remark that the duration of the paroxysm distinguishes relapsing fever from malaria does not hold for Central Africa, where microscopical examination of the blood is essential for diagnosis. As regards that region, to the list of complications and sequelae should be added facial paralysis and iritis. Readers of this *Bulletin* will not subscribe to the statement that no drug treatment has been introduced which has been successful in cutting short the course of the disease; salvarsan, neosalvarsan, galyl and ludyl have been used with unquestionable benefit [this *Bulletin* Vol. 1, p. 34 and 628; Vol. 3, pp. 3 and 397; etc.].

Malaria receives 20 pages, probably sufficient for the practitioner in the British Isles. The incubation period is given as 24 hours and upwards. It is doubtful whether such a short incubation as 24 hours has been authenticated for any form of malaria. The author's remarks on the treatment of malignant infections are not in all respects accordant with present day knowledge. He advises that quinine be given intramuscularly "on the slightest hint of the onset of nervous symptoms . . . as any delay in getting the patient under the influence of quinine may result in his death." Again "if the malignant attack continues it is well to resort to intramuscular or intravenous injections." There can hardly be a doubt of the superiority of intravenous over intramuscular quinine medication, absorption from the muscles being a slow process, so that in such emergencies the intramuscular method is not advisable. Otherwise the remarks on the treatment of malaria are judicious.

Of the treatment of the enlarged spleen of malarial cachexia the author writes:—"A heroic practice may be resorted to, which is sometimes very successful, the injection of 20-30 minims of turpentine subcutaneously into the abdominal wall overlying the splenic enlargement." Dr. Muir

of Kalna uses turpentine in a less heroic dose intramuscularly for chronic malaria as well as kala azar [see this *Bulletin* Vol. 2, p. 327]. The result is a polymorphonuclear increase followed by marked improvement of the signs and symptoms. The injections are given weekly.

"The existence of pools of still water is absolutely necessary to the breeding of the mosquito with which malaria is so closely connected," is not true for the tropics. The following statement may be quoted with approval—"It has been shown in British Colonies that the belief in the mosquito-malarial theory on the part of the governor has been half the battle in freeing a district from malaria, while an obstinate and unbelieving set of officials have made the efforts of the medical officer of no avail."

Bacillary and amoebic dysentery receive 14 pages. In the account of bacillary dysentery 'carriers' are not mentioned. As to amoebic dysentery, under heading diagnosis there is a short description of the amoeba, but no mention of *Entamoeba coli* from which *E. histolytica* has to be distinguished. Details are given as to the use of ipecacuanha but emetin is not mentioned, though its successful use was first reported by ROGERS in June 1912, and confirmed by other workers in the same year. The introduction of emetin for the treatment of amoebiasis is, without doubt, one of the most important discoveries of the time. Several cases of amoebic dysentery have been reported in persons who have never quitted France, Great Britain or the northern United States; it is hardly correct, therefore, to say, as does the author, that the disease is not found, save in the form of occasional imported cases, in the more temperate latitudes.

In the account of the epidemiology of kala azar the Sudan is mentioned but not the countries of the Mediterranean coast, nor is the closely-allied, if not identical, disease in dogs referred to. The introduction of tartar emetic for the treatment of this disease is doubtless too recent for inclusion in the book.

An interesting article on typhus extends to 26 pages. The author states that it is practically unknown in the United States of America. Dr. J. F. ANDERSON however estimated that 172 cases occurred in six cities in the year 1912 alone (this *Bulletin* Vol. 2, p. 639); it was formerly unrecognised and known as Brill's disease. The author discusses the mode of infection without mentioning the louse. Transmission of typhus by the body louse was effected by NICOLLE, COMTE, and CONSEIL in Tunis (1909) and by RICKETTS and WILDER in Mexico (1910); further successful experiments were published by NICOLLE and CONSEIL in 1911. GOLDBERGER and ANDERSON brought a similar proof for the head louse (1912). An interesting account of these researches and their bearing on epidemics of the past has been given by Col. BIRT (*Journal of the Royal Army Medical Corps*, 1912, Vol. 19, pp. 521-30). It is hardly necessary to refer in more detail to this matter as nearly every medical journal which comes to hand brings similar evidence from the field of war.

The following statements in the book may be contrasted—(1) "Until the causal agent of typhus is definitely discovered, the method of infection must be a matter of pure conjecture. (2) No specific organism has as yet been discovered as the cause of yellow fever . . . . The disease is transmissible apparently only through the agency of a certain type of mosquito." The first statement is of course incorrect.

Dr. McClure has evidently a poor opinion of the theory that beriberi is acquired by the use of a one-sided diet, deficient in "vitamine." At present, he writes, new evidence all goes to show that the disease is the result of infection by a specific germ which is conveyed to man by some intermediary, of the nature of the louse or bug. Is Dr. McClure unaware of the publications of BRADDON and of FRASER & STANTON from Malaya, and of HEISER and others from the Philippines? These give proof, as absolute as can be obtained in such matters, that the disease in those localities results from the use of a certain kind of rice, the "deficiency" in which is not made up by other ingredients of the diet. There is more recent evidence still, but too recent for inclusion by the author.\* The

\* VEDDER (Edward B.). Beriberi.—viii+427 pp. With 5 coloured plates and numerous engravings. 1913. London: John Bale, Sons & Danielsson, Ltd.

reviewer is unaware of satisfactory evidence of transmission by insect intermediaries, though several authors have declared their belief in it. Dr. McClure states also that the study of outbreaks in gaols in the East goes to show that the disease will persist in certain gaols "despite all changes of diet." Such cases, if indeed they exist, need very careful scrutiny. In view of the many gaols, e.g. the Bilibid prison in the Philippines\* and several in Malaya (this *Bulletin*, Vol. 4, p. 145), in which the disease has been eradicated solely by a change of diet, it is permissible to think that the cases which Dr. McClure has in mind might be explained without recourse to the hypothetical insect transmitter. It is of course true that other factors may operate in some epidemics and it may well be that the term beriberi covers more than one disease, with differing aetiology, but we shall not advance knowledge by refusing to accept what has been demonstrated in many places in the far East. It is unfortunate that in none of the epidemics of 'beriberi' acquired on a varied and vitamin-full diet has the report been so detailed as to be free from criticism by those who uphold deficiency as an all-covering explanation. Such outbreaks should be exhaustively studied by unbiased and well-trained observers.

Although several statements in the book have been called in question the reviewer can state that he has read it with pleasure. The clinical portion—which, be it remembered, forms the bulk—appears for the most part excellent; the epidemiological, as far as tropical diseases are concerned, seems out of date, giving rise to the suspicion that it was written some years ago and has not been revised. One hopes that a second edition will soon be called for and the defects remedied.

The book is clearly written and well printed and has a full index. Temperature charts are furnished at the end of most of the chapters.

A. G. B.

BROOKE (Gilbert E.) [M.A. Cantab., L.R.C.P. Edin., D.P.H., F.R.G.S.].

*Aids to Tropical Medicine.*—2nd Edition. xii + 230 pp. F<sup>c</sup>ap. 8vo. With 30 text figs. 1915. London: Baillière, Tindall & Cox. [Price 3/6 net, cloth; 3/- net, paper.]

This little book, the first edition of which was published in 1908, contains a great deal of information in small compass. It has, the author states, in great part been rewritten, and chapters have been added on Three-day fever, Verruca [*sic*] peruana, Snake bite, Disinfectants, Fleas, Flies, Mosquitoes, and Rats. The chapters are arranged alphabetically according to the headings, which is probably convenient for a book intended for ready reference but has the disadvantage of separating conditions which would naturally come together, e.g. hepatitis and liver abscess, schistosomiasis in Egypt and in the East, the former of which is found under Bilharziasis, the latter mentioned under Distomiasis. The tables are a useful feature; among them may be mentioned those concerning the trematodes of man and their ova, the human filariae, the chief species of anophelines of importance, and synopses of genera of rats and of species of *Mus* and *Nesokia*.

Of the new chapters that on verruga suffers from having been written just before the publication of the work in Peru of STRONG and his colleagues. The useful chapter on Disinfectants includes an account of camp sterilization of potable water, for which THRESH's method (chlorinated lime and "hypo" in  $\frac{1}{4}$  and  $\frac{1}{2}$  pound tins) is recommended. The chapter on Fleas includes an account of their anatomy, life-history and habits, and classification. Under Flies are considered phlebotomus, Tabanidae, and Muscidae, the latter including house-flies, tsetse-flies and stomoxys. The chapter on Mosquitoes includes a brief scheme of diagnosis of Anopheline genera as well as notes on the important species. As Dr. Brooke has evidently found NEAL's method of repelling mosquitoes useful—it is described thrice in the book—it may be mentioned that it consists in

\* *loc. cit.*

dabbing a solution of one ounce of Epsom salts dissolved in half a pint of water on exposed parts of the body and allowing it to dry; this is stated to be "quite protective." But the most considerable addition is the chapter on Rats, covering as it does 15 pages of small print. This would seem rather a full measure of zoology in such a small book, but the data given should be extremely useful and are not found in text books. An appendix contains Notes on the seven commonest carriers of malaria and a Condensed bibliography, giving the titles and prices of recent books.

Naturally there are statements which may be criticised. The most important concerns the aetiology of beriberi. Dr. Brooke devotes about two pages to the "rice-food theory" and tabulates seven arguments against it. But surely no one now regards "deficiency" in rice diet as anything but a special case of deficiency, which bulks prominently because rice is the staple food in the East. It is no argument against the deficiency theory that beriberi prevails where no rice is eaten. Rice free diets may be equally wanting in vitamins. Ankylostomiasis (one is glad that the ugly form *agchylstomiasis* is not adopted) is defined as an anaemic cachexia induced by *A. duodenale*, *N. americanus*, and *A. ceylanicum*; LANE, who found this worm in natives of India, questions whether it is ever present in man in sufficient numbers to produce symptoms. It would seem premature to lump together the usually accepted species of *Leishmania* as *L. donovani*. It does not seem to be the case that *espundia*, or *uta*, begins as a sore on a mucous surface, but rather as a nodule on the skin, afterwards affecting mucous surfaces. In the chapter on pellagra the theory of deficiency is not mentioned, though it was discussed by Dr. SANDWITH in 1913, and has several supporters. Of *spirochaetosis* Dr. Brooke says—"No drugs have any specific action." Salvarsan and other arsenicals appear to bring the disease in many regions to a speedy end.

Another point, mainly of historical importance, in the account of yellow fever. One reads—"Most of our knowledge of the etiology of yellow fever is due to the work of the French Mission to Brazil in 1903. Useful work was also done by a U.S.A. Commission in 1900." The last sentence hardly does justice to the pioneers in this research, one of whom paid for the proof of mosquito transmission with his life.

These however are but small blemishes and to those who like their information in a condensed form and in a manual which will slip into and not bulge the pocket the book may be recommended. Misprints of importance are few—KEDDER for VEDDER (p. 14) and "bladders" for "gall bladders" (p. 39) were noted.

Undulant fever appears as "Malta fever" in spite of the adoption of the former name by the Tropical Section of the International Medical Congress, London (1913).

A. G. B.

CUNNING (Joseph). [M.B., B.S., F.R.C.S.]. *Aids to Surgery*.—3rd Edition. viii + 416 pp. Fcap. 8vo. 1913. London: Baillière, Tindall & Cox. [Price 4/- net.]

This little book is one of a series stated to be "specially designed to assist students in grouping and committing to memory the subjects upon which they are to be examined." The fact that since its publication in 1904 it has now reached a third edition goes to show that it is of value for this purpose.

A. G. B.

## TROPICAL DISEASES BUREAU.

TROPICAL DISEASES  
BULLETIN.

Vol. 6.]

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[No. 8.

## HELMINTHIASIS.

LEIPER (Robert T.). **Report on the Results of the Bilharzia Mission in Egypt, 1915.**—*Jl. R. Army Med. Corps.* 1915. July. Vol. 25. No. 1. pp. 1-55. With 22 figs; Aug. No. 2. pp. 147-192. With 17 figs.

The author notes that the only mode of dealing successfully with bilharziasis is to prevent its spread to uninfected persons. He illustrates the character of the disease and the corresponding financial burden from the experience of the Boer war. Of 625 men who became infected in South Africa, 359 were still on the list in 1911 exclusive of those permanently pensioned. The total cost to the State was about £10,800 per annum. Though the parasitic nature of the disease was established in 1851 nothing definite had yet been discovered of the life cycle of the parasite or its manner of entering the human body. In 1894 Looss formulated the hypothesis that the disease is communicable directly from man to man, and practically all research since has been directed to the experimental verification of this hypothesis. The result of the investigations into the spread of trematode infections of man in the Far East by the author threw discredit upon the Looss hypothesis [see this *Bulletin*, Vol. 6, p. 296]; hence the present enquiry, with which Drs. R. P. COCKIN and J. G. THOMSON were associated. The Mission arrived in Egypt on February 8th and left on July 15th, 1915.

A map of the world shows the regions from which cases have actually been reported. A search for an invertebrate intermediary has been made by COBBOLD [1870], SONSINO [1874-1885], LORTET and VIALETTEON [1893-94] and by LOOSS. An account is given of these researches, especially those of Looss. Experiments to infect animals were made by HARLEY in 1871 and later by other workers without success. These failures to obtain experimental verification of his theory were explained away by Looss with the statement that man is the only known host of *Bilharzia haematobia*. The practical requirements of this theory of direct infection are indicated by abstracts from Looss's publications.

It has been difficult to obtain reliable statistics of the incidence of the disease in Egypt. FERGUSON stated in 1910 that more than 1,000 post-mortem examinations made by him at the Kasr el Aini Hospital in Cairo revealed the presence of the disease in 40 per cent. of Egyptian

males between 5 and 60 years of age. Recently MacCALLUM in the course of his ankylostomiasis campaign has obtained higher figures.

The fresh-water molluscs of Egypt have been studied by several malacologists, the results being summarized very completely by PALLARY. His list is given and it is indicated which species were examined by previous authors and by the present Mission. It is seen that eleven species were examined by LORTET, SONSINO and LOOSS and 27 by LEIPER and his colleagues. The author continues :—

“In the Natural History section of the magnificent ‘Description de l’Egypte’ prepared by the authority of Napoleon during the French occupation in 1799–1801, eight of the commonest freshwater molluscs are recorded and beautifully illustrated. In three of these we have found undoubted Bilharzia larvae within half an hour’s journey by tram and train from Cairo.

“These are extraordinary facts in the light of Professor Looss’s repeated contention during the past twenty years that he had examined hundreds of specimens of all the molluscs occurring in the Nile Valley without finding any developmental form which might have been brought into relation with the Bilharzia worm.”

The present enquiry was carried out chiefly at El Marg, a village of about 5,000 inhabitants, some nine miles north of Cairo, supplied with water by a small tertiary canal which traverses the village and derives its supply from the main Ismailia Canal a few miles distant. The surroundings of the village are shown by a map and there are numerous photographs of the canal, showing women washing their clothes in it, children fetching water, etc. A rapid examination of the urine of 54 boys in the schools of the village showed bilharzia eggs in 49 cases. It seemed reasonable to suppose that the infection was derived from the Marg canal. A complete census of fresh-water Mollusca in this water was, therefore, made and it was possible to ensure its completeness because the main canal is controlled by the Government, which supplies water for only six consecutive days in every three weeks. A list is given of the species of molluscs collected. These were separated into their different genera and examined for developmental stages by direct inspection or by dissection. When an infected mollusc is kept in a glass vessel in clean water for a few days cercarial forms are frequently discharged and may be seen swimming about in the water if the glass is held against the light and examined with a hand lens. By dissection, the earlier stages are obtained. The technique is detailed. Over 3,300 samples were minutely examined, and 17 specimens of Trematode larvae were identified. A list is given.

It is pointed out that the absence of pharynx in the cercaria is the one reliable character by which a bilharzia cercaria can be distinguished from that of other distomes. Looss stated that none of the Egyptian mollusca exhibited the slightest attraction for the freshly hatched miracidia of bilharzia. In the author’s experience a definite attraction was exhibited by four species of mollusca. Large numbers of snails collected from the Marg Canal were infected with larval forms showing the morphological peculiarities of the bilharzia group. Three cercariae of this type were found in four different species of mollusc. Two of these, species of *Bullinus* and *Planorbis*, are figured. Attempts were made to infect animals with the cercariae—variegated mice and white rats brought from London. These were successfully infected as well as the Egyptian desert rat, guinea-pigs and Mangabey monkeys.

A number of these animals were submitted to infection shortly before departure for England; all when examined in London had enormous numbers of bilharzia worms in the portal system, as is shown in figures.

Looss and others have shown that miracidia are killed immediately by a dilution of 1 in 2,000 of hydrochloric acid. The author found that the cercariae withstood hydrochloric acid 1 : 808 for five minutes. An experiment showed, however, that monkeys could be infected through the mouth. Of four sooty monkeys three were subjected to infection through the skin and one was caused to drink from a cup containing water swarming with bilharzia cercariae. The four monkeys died and all showed a heavy infection with bilharzia, the monkey infected from drinking water having more intense symptoms than the rest. The author believes, however, that the infection enters through the skin in the bulk of cases.

With regard to the incubation period, it is probably from one to two months. One argument brought forward by Looss in favour of his theory was that the disease occurs among children born and bred in large towns such as Cairo, where there is a filtered water supply. The author found that in addition to the series of pipes supplying Cairo with filtered water there is a second system bringing unfiltered water drawn directly from the Nile. This would account for the infection of Cairo children. The table on the following page shows the conclusions based on the Looss hypothesis and those based on the results of the present enquiry.

Part II. deals with prevention and eradication, and firstly with water in relation to the spread of bilharzia. It is pointed out that there are certain physical conditions almost peculiar to Egypt which are inimical to the cercaria and its carrier, "which, if properly exploited, might bring about almost complete eradication of the disease in the course of a few years." These depend on the facts that water is absolutely essential to bilharzia outside the body and that practically all water in Egypt comes from the Nile. (The rainfall at Cairo is only 3.28 centimetres per annum). It is noted that the whole of Lower Egypt under cultivation is irrigated from canals which run throughout the year, and that over 900,000 acres in Upper Egypt are also perennially irrigated, irrigation elsewhere depending on the annual rise of the Nile. The extension of perennial irrigation appears to have encouraged the spread of the disease, as MILTON has pointed out.

Coming to protective measures Col. Leiper divides the life of the bilharzia outside the body into three stages [which may be termed premolluscan, molluscan and postmolluscan] and points out that in large towns a simple means of destroying the free-swimming infective stage [post-molluscan] must be found, whereas in the country villages and districts the worm must be deprived of the essential intermediate host. The prevention of bilharziasis in towns is then considered. Here, as stated above, children acquire the disease from the public supply of unfiltered water. The ideal remedy, to do away with this, seems impracticable. It has been found, however, that it is impossible to keep the cercariae alive more than 36 hours; hence storage for a day and a half would meet the case. The water would have lost its valuable sediment but, on the other hand, under the present system about ten thousand children in Cairo become infected



annually. The origin of this bilharzial infection is discussed. It is shown with the aid of a map that whereas in the Delta water used for irrigation does not return to the Nile, above Cairo it does and, taking into account the velocity of the river at different seasons and the maximum life duration of the cercaria, it is pointed out that the Nile at Cairo, and hence the unfiltered water supply, should be infective chiefly during the autumn.

#### CONCLUSIONS CONTRASTED.

##### "Conclusions based on the Looss Hypothesis.

"1. All transient collections of water, such as those resulting from occasional showers of rain, road waterings and domestic waste, are dangerous if freshly contaminated.

"2. Large bodies of water, such as the Nile, canals, marshes and birkets, are little liable to be infective.

"3. All water in a given area would automatically become safe in thirty hours if the native infected population were removed.

"4. Infected troops would be liable to reinfect themselves, to spread the disease among other troops, and to convey the disease to any part of the world.

"5. Infection only takes place through the skin.

"6. Infection in towns is due to contact with recently contaminated moist earth or water.

"7. Eradication depends upon education and complete sanitary control throughout the country. The sustained co-operation of the affected individual is essential."

##### "Conclusions based on the Results of the Present Inquiry.

"1. Transient collections of water are quite safe after recent, contamination.

"2. All permanent collections of water, such as the Nile, canals, marshes and birkets, are potentially dangerous, depending upon the presence of the essential intermediary host.

"3. The removal of infected persons from a given area would have no effect, at least for some months, in reducing the liability to infection, as the intermediate hosts discharge infective agents for a prolonged period.

"4. Infected troops cannot reinfect themselves or spread the disease directly to others. They could only convey the disease to those parts of the world where a local mollusc could efficiently act as carrier.

"5. Infection actually takes place both by the mouth and through the skin. Recently contaminated moist earth or water is not infective.

"6. Infection in towns is acquired from unfiltered water, which is still supplied, even in Cairo, in addition to filtered water, and is delivered by a separate system of pipes.

"7. Eradication can be effected without the co-operation of infected individuals by destroying the molluscan intermediaries."

The next section deals with infection in the maritime canal zone, of special interest at the present time. Ismailia, Suez and Port Said are supplied by the sweet water canal which leaves the Nile north of Cairo. Its length and the velocity of its contents are such that infection entering at the head would have died out before reaching Ismailia. In the portion near the maritime canal there is much weed and specimens, uninfected, of *Bullinus* were found. Examination of the children at the schools at Port Said and Suez showed that the water is but lightly infected. The native population at Ismailia, among which there is "a fair amount of bilharzia," appear to derive their infection from the marshes, where infected *Planorbis boissyi* were found; these can be dealt with adequately only by filling.

Prevention in agricultural districts depends on the Government control of the Nile water. Where irrigation is perennial the water is not allowed always to run; during the summer months, April to August, the head regulators are periodically closed, six days supply being followed by fifteen days cessation. Leiper's proposals for eradication are based on his study of the problem in the Marg district. The Marg canal became dry during the 15 days stoppage and *Planorbis* and *Bullinus* taken from the dry bottom did not revive when placed in water. Had the alignment of this canal been more correct there would have been no puddles to act as a "carry over," and the rotation itself would have killed the molluscs "just at the commencement of their annual reproductive activity." The same object might be attained by the provision of an alternative route for the rotation water from the secondary canal to the fields, or by treatment of the puddles with chemical agents such as ammonium sulphate. The periodical clearing of the small open drains must be regarded as an essential part of any scheme till closed drains are adopted. The campaign would be in progress from April to August. Leiper goes on to consider the state of the crops during those months and concludes that during June and July two-thirds of the land is in fallow, the remaining third being under cotton. These are also the months in which evaporation is at its height, as is shown by a chart. It should be possible, he thinks, to use only a third of the tertiary canals during these months, the others and the drains supplied by them becoming desiccated.

The subject of reclamation is then considered and, finally, the protection of the troops, and personal prophylaxis. These necessitate a study of the bionomics of the cercariae. A mouse became infected after ten minutes immersion, which shows that the skin can be pierced very rapidly. No cercariae survive 48 hours in tap water. On the other hand "they cannot withstand the slightest desiccation." They need oxygen and they are killed if the temperature is momentarily raised to 50° C. Experiments were undertaken in which the cercariae were subjected to the action of acids, acid salts, essential oils and antiseptics. The results are set out in tabular form. It is seen that 1:1000 sodium bisulphate kills them "almost immediately." The practical conclusions are:—

"That unfiltered water taken from canals, ditches, or birkets would be rendered safe:—

"(1) If kept beyond the survival period of the cercaria, i.e., for forty-eight hours.

"(2) If heated to 50° C., a temperature at which the cercaria is immediately killed.

"(3) If previously treated with those chemicals that are lethal to the cercaria."

The use of "tabloids" of sodium bisulphate, 16 grains to a pint of water, giving a dilution of 1 in 567, is recommended.

The following points should be attended to:—

"(1) Personal contact of any kind with unfiltered water is risky. The surface of the water is the most likely to be infective as the cercariae congregate there. An intake pipe should always be led therefore to the centre of the stream and should draw the water from near the bottom and at a place where there is little or no vegetation.

"(2) It is essential in drawing water for storage, in order to destroy the bilharzia cercaria, that no infective mollusc be admitted. This can be ensured by screening the intake pipe with gauze having about sixteen meshes to the linear inch. The common mosquito gauze or phosphor-bronze wire gauze is very serviceable.

"(3) The water in the wells and 'sakias' may be regarded as much safer than that from other sources. Hitherto molluscs have not been found in these wells.

"(4) Shallow barrel sand-filters are open to suspicion. It has been found experimentally that after fifteen minutes cercaria succeed in passing in large and increasing numbers through four inches of desert sand.

"(5) Although the reproductive activity of bilharzia in the molluscs is probably most intense during the summer months the occurrence of mature cercariae in infected molluscs in February shows that there is a certain liability to the infection throughout the year."

The report, the value of which it is superfluous to indicate, is illustrated by good and instructive photographs. The Bibliography, which is one hopes exhaustive, comprises 532 references. With the account of the concluding portion, not yet appeared, it is hoped to reproduce some of the illustrations.

A. G. B.

## AMOEBIASIS AND DYSENTERY.

## AMOEBIASIS.

CHRISTIE (W. Ledingham). **Further Investigations into Latent Dysentery and Intestinal Parasitism in Sarawak, Borneo.**—*Brit. Med. Jl.* 1915. July 17. pp. 89-90.

The author, writing from Sarawak, gives the results of an examination of the faeces of 100 Malay men, women and children without any reference to present or past illnesses. Four slides from each sample were examined and amoebae were chiefly searched for. Only moving specimens or those well stained by neutral red were counted. "They had the eccentric nucleus, blunt pseudopodia and other characters of *A. histolytica*." The investigation yielded the following results: *Amoeba histolytica* was found in 59 per cent. of the samples, *Ankylostoma duodenale* in 59 per cent., monads in 66 per cent. (*Trichomonas* 63 per cent., *Cercomonas* 3 per cent.), roundworms (*Ascaris lumbricoides*) in 79 per cent., whipworm (*Trichocephalus dispar*) in 84 per cent.; 17 per cent. of persons were harbouring several sorts of parasites at the same time. On enquiry, it was ascertained that of those in whom amoebae had been found 34 could remember having had dysentery, 26 could not, while of the negative cases 10 had had dysentery and 13 had not. The writer gives notes of a series of cases, showing that persons who were harbouring apparently non-pathogenic amoebae, contracted later an acute dysentery due to amoebae of similar appearance.

The writer concludes that amoebic dysentery is endemic among Malays of the Sarawak River; that some immunity seems to exist against very severe attacks or epidemics; but that an educational and remedial campaign would be beneficial.

Ordinary hygienic cleanliness and care, with freedom from intimate association with natives, will usually protect Europeans from danger of death from amoebic dysentery.

J. C. G. Ledingham.

GARRETT (F. D.). **Amoebic Infection.**—*Texas State Jl. Med.* 1915. May. Vol. 11. No. 1. pp. 32-36. With 3 text-figs.

Amoebiasis is prevalent in the great seaports such as Galveston, New Orleans, San Francisco and Baltimore, but it appears to be increasing among the natives in the interior especially in the south. No doubt the opening of the Panama Canal will increase the number of carriers of this disease in Texas unless proper precautions are taken. The paper contains notes on diagnosis of the various amoebae, clinical symptoms and pathological lesions, etc. With regard to emetine he says that to prevent recurrence from encysted amoebae in the tissues it is best to give emetine in full doses and quinine enemas three days in every fourteen for at least two months after the first three weeks of intensive treatment have been completed. It would be wise also to examine the stools at intervals for a year after the patient is apparently well.

J. C. G. L.

- i. CORLETTE (C. E.). **Amoebic Dysentery and Abscess of Liver: An Indigenous New South Wales Case.**—*Med. Jl. of Australia.* 1915. May 8. Vol. 1. 2nd Year. No. 19. pp. 427-428.
- ii. JEFFREY (Eric). **A Case of Endemic Tropical Dysentery.**—*Ibid.* June 5. No. 23. p. 532.

i. The case is reported for its epidemiological rather than for its clinical interest. The patient had never been out of New South Wales. Amoebae were present in the pus of the abscess and also in the faeces. Records of at least six other similar cases in past years in New South Wales are cited. All have been males. The writer thinks it is probable that there have been many privately observed cases of amoebic dysentery and amoebic liver abscess in New South Wales and other parts of Australia, which have not been recorded in the literature. He raises the point whether mines may not become so infected as to constitute endemic centres of amoebic dysentery, as may be the case in ankylostoma.

ii. This case occurred in a native of New South Wales, who had never left Australia and had not even visited Queensland. Amoebae resembling *E. histolytica* were present in the stools.

J. C. G. L.

- CHALMERS (Albert J.) & ARCHIBALD (R. G.). **The Cure of Amoebic Dysentery.**—*Jl. Trop. Med. & Hyg.* 1915. Aug. 16. Vol. 18. No. 16. pp. 181-183. With 1 plate.

The authors draw attention to the importance of diagnosing cryptic amoebic infections and of ascertaining when it is safe to say that an actual cure has been realised. Sometimes lesions are limited to the caecum and ascending colon and this carrier or cryptic condition may last for many months or years. Another form of latency is that simulating appendicitis, accompanied by pain in the right iliac fossa together with a sense of resistance or of thickening in that region. This may, in the authors' experience, be accompanied by mild febrile attacks. Mild anaemias have also been associated with amoebic infections. They have seen a case of latency without noticeable diarrhoeal attacks, which must have lasted three years or more. A *differential leucocyte count* is, in the authors' opinion, the only quick and ready means for the diagnosis of latency. There is an increase of the mononuclear leucocytes without distinct evidence of malarial or other protozoal infection. The diagnosis of cure can be definitely ascertained only by repeated differential counts. A differential count should be made before the emetin treatment and again after the amoebae have disappeared from the faeces. As a rule, after the amoebae have disappeared the mononuclear count remains high or may increase. The treatment is now stopped for about a fortnight when the count is again made. If signs of discomfort over the caecum and ascending colon appear, emetin is repeated for a few days. In this way, the intervals of non-treatment are lengthened and the intervals of treatment are shortened until the mononuclear count returns to normal or nearly normal. In cases treated with emetin, there is also an increase of the eosinophiles. This eosinophilia disappears with the cure of the amoebiasis and the cessation of the emetin treatment.

It is the authors' practice now to make a differential count on any person who shows anaemia of non-malarial or non-kala-azar origin or who has any peculiar intestinal, urinary, pulmonary or joint affection.

If there is a marked mononuclear increase not explicable by malaria, a purge is given and the motions examined for amoebae on more than one occasion.

The paper contains a plate showing unstained preparations of *L. tetragena* and cysts.

J. C. G. L.

**SCHWALB (Johannes). Beitrag zur Behandlung der Amöbendysenterie mit intravenösen Emetininjektionen.** [The Treatment of Amoebic Dysentery with Intravenous Injections of Emetin.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1915. Mar. Vol. 19. No. 5. pp. 147-148.

Two physicians, who accidentally infected themselves with the pus of a liver abscess, contracted amoebic dysentery. The patients came under observation on the first day of the disease. Each received on the first two days 100 mg. emetin in 150 cc. inoculated intravenously. On the 5th and 9th days of the disease each got a further dose of 60 mg. in 100 cc. saline. Amoebae were still present in the stools on the 14th and 10th days respectively, and accordingly a final course of intravenous emetin injections was undertaken.

Both patients were apparently well at a date four months after the end of the treatment. There was no local reaction and no fever, no vomiting or faintness. Merck's emetin hydrochloride was used. The solutions in saline were made up before use and sterilised in the steamer for 20 minutes.

J. C. G. L.

**CHALMERS (Albert J.) & PAPATHEODOROU (Dimitri). The Administration of Emetine during Pregnancy and Menstruation.**—*Jl. Trop. Med. & Hyg.* 1915. July 15. Vol. 18. No. 14. pp. 159-160.

The authors commence by stating that according to the pharmacologists ipecacuanha has a direct effect on the uterus, increasing its contractions, and that therefore its administration in large doses in pregnancy should be avoided. On the other hand there is a published record of the administration in  $\frac{1}{2}$  grain doses daily of emetin to a woman in the sixth month of pregnancy suffering from amoebic dysentery. There was no ill effect. The authors were called upon to treat a woman in the third month of pregnancy and decided that emetin was not contraindicated, as it would certainly relieve the dysenteric attack which *per se* might cause a miscarriage. An injection of 4 cg. of emetin was given intramuscularly and 16 hours later the patient complained of severe pain on the right side of the pelvis. Another dose of 4 cg. was given and three hours thereafter she complained of strong pains in the uterus. The uterus could be easily felt but nothing abnormal was detected. Small doses of Tinct. opii and, later, a hypodermic injection of morphine and atropine were given but none of these relieved the pains. Thirty-six hours after the first injection the pains ceased and it was decided to give no more emetin. The woman speedily recovered from her dysentery and the pregnancy was apparently unaffected. In another case, menstruation appeared

during the emetin treatment ( $\frac{1}{2}$  gr. doses daily) but suddenly ceased on the second day of the period though the injections were stopped. Two subsequent periods were perfectly normal.

They decide that  $\frac{1}{2}$  gr. (about 3 cg.) is the maximum daily dose which can be given safely in pregnancy and that the effect of the doses should be carefully watched. It is not advisable to give emetin during the menstrual period but, if urgently required, it can be given without causing serious harm and can be continued in the intermenstrual period.

J. C. G. L.

LYONS (Randolph). **Mode of Action and Use of Emetin in Entamoebiasis.**—*Amer. Jl. Med. Sci.* 1915. July. Vol. 150. No. 1. pp. 97-109.

The chief points to which attention is drawn are the following :—Entamoebas free in the lumen of the gut are apparently not affected by emetin or ipecac given orally or subcutaneously. It is not definitely known how or in what form ipecac and emetin are eliminated from the body, but there is some experimental evidence that the amoebicidal principles of ipecac when taken by the mouth are not eliminated in the faeces. The failure of emetin given hypodermically to destroy *Entamoeba coli* argues against the elimination of the drug from the circulation by way of the large intestine. Relapses are due to the survival of some of the entamoebas probably through encystment. In the carrier state the entamoebas are probably simply harboured in the lumen of the gut in the same manner as *E. coli*, thereby causing no symptoms. The intestinal mucosa is in some way protected against the penetration of the organism.

Emetin is best given hypodermically and in severe cases intravenously. Oral administration is not advisable owing to the resulting intestinal irritation. The whole drug is preferable for this route ; in an ordinary case of amoebic dysentery an average of 1 gm. daily or less is sufficient. The duration of the treatment is from 1-2 weeks. Too large doses or too prolonged use of moderate doses may cause a diarrhoea or be responsible for its persistence. In order to prevent relapse, an intermediate form of treatment should be instituted in every case, even though cysts are not found.

Emetin subcutaneously or locally has been shown to be practically specific in pyorrhoea alveolaris. Its use in haemorrhagic conditions is entirely empirical and its value is questionable.

J. C. G. L.

DUMÉZ (A. G.). **Two Compounds of Emetine which may be of Service in the Treatment of Entamoebiasis.**—*Philippine Jl. Sci.* Sect. B. Trop. Med. 1915. Jan. Vol. 10. No. 1. pp. 73-79.

Although emetin has given good results in the treatment of amoebiasis, there is still room for improvement. The author introduces two new compounds, viz., emetine mercuric iodide and emetine bismuthous iodide. The method of preparing them is detailed. Both are insoluble in water or in water acidulated with HCl. No clinical evidence is yet available as to their usefulness. It is possible

however, from experiments carried out on dogs, that these two compounds may be capable of administration in large and frequent doses and may permit of the emetine coming in contact for a longer period with the entamoebae it is calculated to destroy.

J. C. G. L.

SNELL (John A.). **Death of Child probably due to Emetin.**—*China Med. Jl.* 1915. May. Vol. 29. No. 3. pp. 164-167.

Female child of five years in whose stools amoebae were found. Emetin,  $\frac{1}{4}$  gr., was given intravenously on November 5th.

For the next five days  $\frac{1}{4}$  gr. was given daily subcutaneously. On the 11th  $\frac{3}{4}$  gr. was given and during the next three days 1 gr. was given daily. On the 14th there was only one stool which was normal and the child seemed well. On the 15th the child had slight photophobia. On the 17th the mouth was ulcerated and the gums swollen and on the following day there was a slight rash on the legs. On the 19th the stools again contained mucus and emetin was again given ( $\frac{1}{4}$  gr. on 19th and 1 gr. on 20th). The stools contained blood and mucus. On the 21st there were only three motions and  $\frac{3}{4}$  gr. was given. Photophobia became more marked and the child was becoming weak. On the 22nd  $\frac{3}{4}$  gr. was given. Rash appeared over entire body and the lips and gums were swollen. On the 24th there was considerable difficulty in swallowing. The breath was very foul and the abdomen was slightly tender on deep pressure. The stools (3-5 per day) contained some bright red blood and mucus.  $\frac{1}{4}$  gr. of emetin was given and repeated on the 25th. By this time the rash had become confluent on the face and the mouth symptoms worse. It was decided that possibly there was emetin poisoning and no more was given. On the following days, the condition of the mouth, throat and tongue considerably improved but the ability to swallow became progressively worse. It was concluded that a partial palsy of the muscles of deglutition existed. The child died on the 28th. *There was no autopsy.* In all the child received 10 $\frac{3}{4}$  gr. over a period of 21 days.

In an editorial article on this case the feeling is expressed that the case is "not proven." The absence of an autopsy is unfortunate. Peripheral neuritis is not uncommon as a complication of dysentery and "our natural feeling is one of wonder whether the dosage of 10 $\frac{3}{4}$  gr. spread over 21 days was the main factor in causing the death of the child."

J. C. G. L.

ACHARD (Ch.) & FOX (Ch.). **Deux Cas d'Amibiase Hépatique en Foyers disséminés avec Cirrhose Hypertrophique.**—*Arch. de Méd. Experim. et d'Anat. Path.* 1914. July. Vol. 26. No. 4. pp. 345-365. With 3 figs.

Record of two cases of cirrhosis of the liver associated with miliary necrotic nodules, which proved after bacteriological examination to be of amoebic origin. The patients had returned to France after 13 years' and 10 years' sojourn in the tropics and during the following 7 years and 18 years respectively, they had enjoyed good health. Both had suffered from malaria. Symptoms of hypertrophic cirrhosis intervened in each case and death took place, in the one from pulmonary gangrene with terminal haemoptysis and in the other from haematemesis. At autopsy, the lesions were identical. The liver was large with irregular contour and studded on the surface with nodular masses, the intervening depressions revealing advanced cirrhosis.



On section the organ was hard and showed numerous sulphur-yellow nodules easily enucleated and easily crushed by the finger. Each nodule was surrounded by a sclerotic zone. The spleen was enlarged, but there was no ascites. Histological examination of a nodule from within outwards showed (1) a central portion consisting of amorphous granular matter, (2) an intermediate zone formed by embryonic connective tissue and infiltrated with leucocytes (pyogenic membrane), and (3) a peripheral hyperaemic zone formed by enlarged liver trabeculae. The capillaries of this latter area were congested and the intertrabecular spaces were infiltrated with leucocytes. In the dilated capillaries and in the interstices of the connective tissue, were amoebae, badly stained for the most part, some with retracted and more or less vacuolated protoplasm and others in the encysted state with multiple nuclei. Some of them contained red cells by the side of the empty vacuoles. The nuclei stained well with haematin and occupied an eccentric position. (The authors note that the preparations were seen by DOPFER, who gave it as his opinion that the elements in question were amoebae).

The insular cirrhosis, of which a detailed histological report is supplied, was probably due to malarial as well as to amoebic infection.

J. C. G. L.

ROGERS (Leonard). *Pyorrhoea alveolaris* as a *Streptococcal* and *Amoebic* Disease, and its Treatment by Vaccine and Emetine.—*Indian Med. Gaz.* 1915. Apr. Vol. 50. No. 4. p. 121.

The author remarks on the great frequency of pyorrhoea alveolaris in the tropics, and the resistance of the disease to treatment. It may be associated with impairment of the health of the patient, "such as indigestion, sprue-like diarrhoea and anaemia." From a case of chronic sprue "accompanied by very advanced pyorrhoea alveolaris with looseness of all the teeth, . . . a nearly pure culture of streptococci [was obtained] from the pus, and the condition was completely cured in a few weeks by injections of an autogenous streptococcus vaccine and emetine." Similar cases have been encountered since. Cultures on glycerine agar have nearly always shown almost pure cultures of streptococci, "but in one with small gumboils a mixed strepto- and staphylococci were obtained." In each case autogenous vaccines were prepared, with satisfactory results.

The initial dose of the streptococcal vaccines was usually fifty million, and a week later one hundred million, repeating at weekly intervals as long as necessary.

"Out of seven successive cases which have been under observation for upwards of a month, four were completely cured after receiving from four to six injections. One improved greatly but relapsed, and amoebae were then found in the pus. One patient attended very irregularly and received only three doses in the course of two months, with but slight improvement, the treatment not having been given a fair chance. The remaining case was a very bad one with tender gums and severe and very frequent attacks of facial neuralgia. He has had eight injections of the vaccine, and is very much better, although still not quite cured. After three injections the neuralgia disappeared, and has not recurred. The sprue patient has remained well for fifteen months, but in the other cases only two or three

months have elapsed, so it is too early to say if the recovery will be permanent. The above results are, therefore, very satisfactory in such an obstinate affection. Several other cases are making good improvement after only two or three weeks treatment."

The author also found amoebae in pyorrhoea alveolaris. Numerous active amoebae were found in a very chronic case of the disease. On the day following the subcutaneous injection of one grain of emetine only a few sluggish amoebae were found. After a second dose of emetine they had disappeared from the pus and the gums showed slight improvement. After four bi-weekly injections of emetine, copious pus was still present although no amoebae could be found, and vaccine is being tried.

"Probably a combination of vaccines and emetine will be the best treatment of this obstinate disease, and promises to be effective, even in severe cases which have resisted all local treatment."

H. B. Fantham.

SMITH (Allen J.) & BARRETT (M. T.). *The Parasite of Oral Endamebiasis, Endameba gingivalis* (Gros.).—*Jl. Parasit.* 1915. June. Vol. 1. No. 4. pp. 159-174. With 1 plate.

The pathogenic importance of the endamoebae of the human mouth has been recently advanced by the present authors and others [see this *Bulletin*, Vol. 6, pp. 55-57.] The parasites are regarded as "either directly causative of a large class of gingival and alveolar pyorrheas or as important members of a symbiotic chain with one or other of the numerous associated vegetable micro-organisms, in the production of these lesions." . . . "Proof of the pathogenic importance of the endamebae in Riggs' disease rests upon their almost constant presence in the suppurating pockets of pyorrhea, and the prompt removal of both suppuration and of the endamebae when emetin, a proved amebicide but of low bactericidal value, is administered locally or generally." Such cases should be termed endamoebic pyorrhoea. Certain systemic complications may be connected with the presence of oral endamoebae.

The main part of the paper consists of an endeavour to coordinate the various amoeboid organisms described as being parasitic in the human mouth. It is considered that *Amoeba gingivalis* Gros, 1849; *Amoeba buccalis* Steinberg, 1862; *Amoeba dentalis* Grassi, 1879; and *Entamoeba buccalis* Prowazek, 1904 are synonymous. The scattered literature relating to these various organisms has been carefully consulted, and useful extracts are given therefrom. It is concluded that the correct name for these parasites is *Endamoeba gingivalis* Gros, 1849. The authors adopt the spelling *Endamoeba* of Leidy, 1879, in preference to that of *Entamoeba*, Casagrandi and Barbagallo, 1897. The work of CHIAVARO (1914) on these parasitic oral amoebae, done in the laboratory of GRASSI, is mentioned. His conclusions, which preceded but agree with those of the present authors as to synonymy, are quoted.

A description of *Endamoeba gingivalis* is given. Its usual diameter is said to be  $30\mu$  to  $35\mu$ , with refractile and faintly greenish hyaline ectoplasm and slightly granular endoplasm. The latter may contain digestion-vacuoles in which globular detritus of leucocytic nuclei and

red blood cells may occur, together with bacteria. The nucleus is round and almost invisible in life. It is often near the centre of the organism and it measures  $2\mu$  to  $5\mu$  across. It is vesicular, with a karyosome. The nuclear membrane is thin. The pseudopodia are few, usually lobose and composed almost entirely of ectoplasm. Binary fission was seen and also cysts.

*Entamoeba kartulisi*, observed in the pus of abscesses of the lower jaw, is considered to be *E. gingivalis*. The oral parasite known as *Entamoeba pyogenes* Verdun and Bruyant, 1907, is also considered. It is thought to be different from *E. gingivalis*. *Entamoeba mortinatalium* [see this *Bulletin*, Vol. 5, p. 209] and its possible identity with amoebae found by TIETZE and by RIBBERT in the parotid glands is noted. [These organisms may possibly be forms of *E. gingivalis*.]

In conclusion, the morphological similarity of *E. gingivalis* and *E. histolytica* is briefly discussed. The authors state that they "are unwilling to make any assertion which involves biological identity in full, merely asserting that the morphological similarity is so close that [they] feel unable to make a distinction from microscopic observation alone." It is stated that *E. gingivalis* does not form "reproduction cysts."

An interesting plate illustrates the paper. It contains reproductions of some of the figures of the earlier observers. [It is to be regretted that the plate is crowded and that, in consequence, some of the figures are much reduced, so that some necessary details are hardly discernible.]

H. B. F.

**MARSHALL (D. G.). Primary Malignant Adenoma of the Liver simulating Tropical Abscess.**—*Edinburgh Med. Jl.* 1915. July. New Ser. Vol. 15. No. 1. pp. 29-31. With 1 plate.

The patient (34 years of age) had been in Rhodesia for some years. There was no leucocytosis but a slight increase in the large mononuclears. Examination of stools for amoebae and ova was negative. No history of dysentery. At the laparotomy the surface of the liver was found to be irregularly nodular and an excised portion showed a rapidly growing malignant adenoma. As the writer remarks: "It is advisable in doubtful cases to bear in mind that patients from the tropics presenting signs of affection of the liver may be suffering from diseases not necessarily limited to the tropics."

J. C. G. L.

#### BACILLARY DYSENTERY.

**SACQUÉEPEE, BURNET & WEISSENBAACH. Recherches sur les Diarrhées et la Dysenterie des Armées en Campagne.**—*Paris Méd.* 1915. July 24. Vol. 5. Nos. 11-12. pp. 200-203.

This paper contains brief notes of the various clinical types of diarrhoea and dysentery met with in the field (French 4th Army) and the bacteria associated therewith. The types are thus classified:—

1. In the great majority of the cases (about two-thirds) the diarrhoea was of a simple character. The stools were fluid and never contained blood or mucus. Under healthy sanitary conditions the diarrhoea disappeared in a day or two. Only a change of regime was necessary.

2. A form of mucous diarrhoea more serious than the first and lasting one to three weeks, yielding only with difficulty to various treatments. Sometimes a cachectic state supervened. The stools were fluid and contained flakes of mucus.

3. Cases showing the typical dysenteric syndrome with tenesmus and blood and slime in the motions. The majority of these ran a mild course yielding either to specific (serum therapy) or to non-specific remedies. There were two very grave cases, one due to *B. Flexner* being saved by massive intravenous injections of serum, the other (fatal) being a mixed infection with *B. para. (B)* and *B. dysenteriae*.

4. Choleraic forms with vomiting, and frequent fluid stools containing no mucus or blood. Pulse was rapid and the other symptoms were those of severe intoxication.

Of types I and II there were altogether 115 cases, of type III 20 cases and of type IV 3 cases. Bacteriological investigations in Group I yielded *B. dysenteriae* (Y) in 8 cases, *B. dysenteriae* (Type W) in 5 cases, *B. typhosus* in 2 cases, *B. para. (A)* in one case and the *Enterococcus* in 5 cases.

In Group III *B. dysenteriae* (Flexner) was recovered from one case, *B. dysenteriae* (Y) from 7 cases, *B. dysenteriae* (W) from 6 cases, and *B. para. (B)* from one case. In one case there was a mixed infection with *B. para. (B)* and *B. dysenteriae* (W).

In Group IV. *B. para. (B)* was recovered from the blood in one case. In another streptococci were recovered from the blood and organs at autopsy while in the third, spirilla differing from *V. cholerae* in cultural and biological properties were found in the dejecta.

*B. dysenteriae* (Shiga) was never found.

[The special features of the type "W," which the authors consider to be new, are not mentioned.]

With regard to the factors predisposing to dysentery outbreaks the authors specially refer to difficulties of transport especially of foodstuffs, pollution of drinking water supplies, the effect of "cadaverism"—inhalation of noxious gases from dead men and beasts lying in the immediate vicinity of the trenches, the monotony of meat diet leading to digestive troubles, cold, etc. All of these factors are capable of reasonable elimination by improved sanitary measures. *In severe cases of dysentery the use of specific serum therapy should never be neglected.*

J. C. G. L.

STRAUSS (H.). *Zur Aetiologie der Dysenterie und dysenterieähnlicher Erkrankungen.* [On the Etiology of Dysentery and Allied Conditions.]—*Arch. f. Verdauungskr.* 1915. Feb. 15. Vol. 21. No. 1. pp. 16-22.

In war time it is of great importance that the etiological factor in any particular form of "dysentery" should be known at the earliest possible moment, as the appropriate therapy and prophylaxis depend so greatly on this knowledge. The bacteriological examination should be undertaken as soon as possible after the stool is passed. In spite of this precaution, however, the causative bacilli are not seldom missed.

The writer had previously recorded three cases of clinical dysentery in which neither dysentery nor paratyphoid bacilli were recovered from the stools, but in which agglutination of *B. dysenteriae* Y and also *B. paratyphosus* by the patients' sera occurred [? A or B.]. This line of research he has continued in a subsequent series of eight cases, four of which were clinically dysentery and four only suspects. In one only of these cases was *B. dysenteriae* (Flexner) recovered from the stools. Four of the eight cases agglutinated *B. Shiga* and *B. Flexner* Y in 1 in 100 or over, while two agglutinated *Bac. Y.* only. Two agglutinated paratyphoid bacilli only. He draws the conclusion from these findings that a form of acute haemorrhagic colitis due to the paratyphoid bacillus is not uncommon. [This may be true but is entirely unwarranted from the evidence.] In peace time he had observed paratyphoid infection to take the form of a pure colitis rather than that of the usual gastroenteritis paratyphosa.

Soldiers invalided for dysenteric affections should be very carefully treated and supervised before being allowed to return to service, as the tendency to relapse is always present. In cases in which the aetiological factor has not been ascertained by bacteriological examination it is worthy of consideration whether dysentery as diagnosed by serological tests should or should not be notified. The etiology of the chronic forms of "dysentery" or colitis gravis has always been a vexed question. The writer was able to recover *B. para.* (B) from the rectal ulcers of a case of chronic haemorrhagic colitis. He also tested the sera of seven cases of chronic haemorrhagic colitis against dysentery and paratyphoid bacilli. All of the cases presented the clinical picture of colitis gravis, with slow onset, shorter or longer intermissions and either continual or periodic evacuations containing blood or blood and pus. None of these cases began as an acute dysentery. One case agglutinated *Bac. Y* in 1 in 100, two agglutinated *B. Shiga* in 1 in 50 to 1 in 150, while one agglutinated *B. typhosus* in 1 in 100. In none of the cases was the corresponding organism recovered from the faeces. The author thinks however that dysentery bacilli and paratyphoid bacilli may be important etiologically in these cases and he recommends further study of such cases from this point of view.

[It is most important that the test strains used in such work should be thoroughly tested with sera of normal persons and also that the technique should be uniform and stated precisely.]

J. C. G. L.

SINGER (Gustav). *Ueber Dysenterie.*—*Militärarzt.* 1914. Nov. Vol. 48. No. 26. pp. 490-495.

Clinical lecture on dysentery, delivered 24th September, 1914. A specimen of the large bowel from a fatal case of dysentery in a soldier was demonstrated and attention was drawn to the great thickening of the muscular wall. This hypertrophy of the muscular coat may develop very quickly. Only certain points require reference. Rheumatism of the muscles and joints is an important complication and occurs in 5 per cent. of all cases. Metastatic affections of the eye may occur, as conjunctivitis and iritis, and also liver abscesses, which are not solitary as in amoebiasis but small and confluent. Cases due to the atoxic strains [Mannite-fermenters] give, as a rule, a good

prognosis. Serum treatment is indicated only in cases due to the toxin-producing races ("Shiga" type) where it is of great value. [This is not strictly accurate as serum therapy has proved useful in severe infections due to "Flexner" strains.] Bowel washes are of great value as they effect the removal of masses of exudate, mucus, blood clots, pus and necrotic masses. In the early stages washes of saline are indicated and in the later stages disinfectant washes containing Pot. permanganate, thymol, salicylic acid, protargol (1/4-1/2 per mille), tannin, etc. Opium should be used very sparingly. Like many other writers, the author strongly recommends the use of bolus alba and animal charcoal (daily 3-4 table spoonfuls of each suspended in water). Simaruba in combination with pomegranate root has a favourable influence on the tenesmus and colic. Dietetic therapy is of prime importance and milk with lime water, or Kefir and Yoghurt deserve mention. Chronic cases occur not infrequently and are often diagnosed as severe ulcerative colitis. The author believes they are generally dysenteric in origin but proof from the bacteriological or serological side is difficult. The rectoscope is required to reveal the condition, which may be treated by caustics or insufflation. Protracted cases often yield to appendicostomy or colostomy followed by washing of the bowel.

J. C. G. L.

VON MUELLER-DEHAN (Albert). **Beobachtungen zur Klinik und Therapie der Dysenterie, insbesondere der postdysenterischen und postulzerösen Polyneuritis.** [Notes on the Symptoms and Treatment of Dysentery especially of Post-Dysenteric Polyneuritis.]—*Wien. Med. Woch.* 1915. Apr. 17. Vol. 65. No. 16. pp. 654-659.

A clinical lecture on dysentery, embodying the writer's experiences in August and September 1914. The dysentery was purely bacillary, both Shiga and Flexner types being met with. Inagglutinable strains of Shiga were occasionally found, also atypical Flexner strains. It was very notable that in many clinically typical cases the bacteriological findings were negative. This may have been due to many causes, e.g. press of work owing to the large mass of samples requiring to be dealt with, or failure to select the most suitable portions of stool for examination. Consequently it was impossible in every case to found the diagnosis on the bacteriological finding. In his opinion, there was no justification for the views of QUINCKE and LESCHKE [this *Bulletin*, Vol. 6, p. 72], who attributed to general alimentary disturbance a mild form of dysentery associated with bloody mucous stools. Müller-Dehan's experience was that slight and severe forms occurred promiscuously and that all cases with bloody stools should be grouped as dysentery. As a rule the course of the dysentery met with in Vienna was very mild. There was only a small percentage of fatal cases and these were usually complicated by wounds or pneumonia. Death from dysentery alone was very seldom. More frequently, the stools would improve but a cachexia supervened, the patient lying apathetic with dry skin, coated tongue and feeble frequent pulse. He had 30 such cases and no form of treatment proved of any avail. Rheumatism was the chief complication. Various forms of neuritis occurred, with skin hyperaesthesias and anaesthesias, trophic disturbances of nails, etc., and sometimes extensive muscular atrophy.

Many acute cases were associated with high temperature, and sub-febrile temperatures were not uncommon especially in convalescence. Parotitis was a very uncommon complication.

With regard to therapy, the great majority got well without any particular therapy. Calomel (0.2 gm. three times in 36 hours) is useful and is only contraindicated by marked cachexia and heart weakness. Its administration, however, should always be well supervised. Systematic administration of opium should be strictly avoided. Remedies like emetin, uzara and simaruba have no definite effect. He has great faith in Bolus alba (100–200 gm. per day) and animal charcoal (up to 80 gm. per day). "Osmosyl," a colloidal silicate preparation, is also useful. Tannalbin is one of the best astringents. Dysentery serum was reserved for very bad toxæmic cases and in such the general condition and the action of the heart were markedly benefited. Chronic dysentery (i.e. cases in which bloody mucous stools persisted over long periods) was very rare. Generally the stools lost their dysenteric character but did not return to normal for months. In such cases enemata containing silver nitrate or Bolus alba were useful.

Intravenous injections of hypertonic salines were given in cases associated with profuse bloody diarrhoea. The rheumatic troubles do not react to salicylates. It is better to use antipyretics and analgesic ointments.

J. C. G. L.

**TEN BROECK (Carl) & NORBURY (Frank Garm).** **The Presence of *B. dysenteriae*, *B. proteus vulgaris*, *Bact. Welchii*, and Morgan's Bacillus No. 1, in the Stools of Cases of Infectious Diarrhea.**—*Boston Med. & Surg. Jl.* 1915. Aug. 19. Vol. 173. No. 8. pp. 280–284.

During the summer of 1914 the authors carried out a bacteriological investigation of the stools in a series of 79 cases of infectious diarrhoea in children at the Boston Floating Hospital, special search being made for *B. dysenteriae*, *B. Welchii* (*B. enteridis sporogenes* Klein) *B. proteus vulgaris* and Morgan's *Bacillus* No. 1. A brief review of the bacteriological findings in summer diarrhoea is given and in connexion therewith they state that "agglutinins for the Morgan's bacillus were not found in the blood of the cases from which it was isolated."

[This is not correct. The results of an extensive series of agglutination tests, for which the reviewer was responsible, will be found in the paper by MORGAN and LEDINGHAM, *Proceedings of the Royal Society of Medicine*, Epidemiological Section, March, 1909.]

With regard to the important question as to the clinical character of the cases, we are told that "infectious diarrhoea is characterised by more or less fever or prostration, tenesmus and the passage of an increased number of stools. *These stools contain mucus and frequently blood and pus.*" [This latter point should be remembered in the light of the resultant data.]

Of the 79 cases, 54 or 68 per cent. yielded dysentery bacilli of the mannite-fermenting type (Type Y). There was no evidence that *B. Welchii*, *B. proteus vulgaris*, *B. pyocyaneus*, Morgan's *Bacillus*

No. 1 or the paratyphoid bacilli played an etiological rôle in infectious diarrhoea, "though they probably influence the course of the disease that is apparently started by the dysentery bacillus."

*B. dysenteriae* (Shiga) was never recovered.

[The above findings are of interest and confirm much of the already recorded bacteriological experience on this subject in America. To this form of summer diarrhoea characterised by the presence of blood and slime in the motions, the term "Bacillary Dysentery" should be frankly applied.]

J. C. G. L.

TEN BROECK (Carl). **A Note on the Invasion of the Bodies of Infants by *B. dysenteriae*.**—*Boston Med. & Surg. Jl.* 1915. Aug. 19. Vol. 173. No. 8. pp. 284-286.

The author summarises the recorded data on the finding of *B. dysenteriae* outside the intestinal tract either ante- or post-mortem. Early in the summer season of 1914, a male baby was admitted with marked prostration and a temperature of 105°. The stools were not those of infectious diarrhoea. A blood culture on the third day of the disease yielded *B. dysenteriae* (Flexner type) and the same organism was recovered from a second blood culture. The patient soon passed stools that were characteristic of infectious diarrhoea and after a long illness recovered. Seven attempts to isolate *B. dysenteriae* from the dejecta were unsuccessful. Blood cultures in 11 other cases of diarrhoea were negative. Also 14 cases were examined at autopsy; in no case was the organism got in the liver or spleen. The single positive blood culture is to be regarded as an accidental invasion rather than a usual feature of the disease.

J. C. G. L.

NORGATE (R. H.) & HALL (I. Walker). **An Outbreak of Institution Dysentery due to the Y Bacillus.**—*Bristol Med. Chirurg. Jl.* 1915. Mar. Vol. 33. No. 127. pp. 44-54.

An interesting contribution to the subject of bacillary dysentery in England. An outbreak of epidemic diarrhoea occurred at Stapleton Workhouse commencing middle of last November, reaching its height at end of December, and falling off towards the end of January of this year. Forty persons were attacked, with five deaths. It is of great interest that the first case and in all probability the person who introduced the infection was a tramp who had been casually employed with colonial troops on Salisbury Plain. This person was admitted to the workhouse on November 23rd and discharged on December 2nd. During this time one of the nurses attending him was transferred to a female ward and five days later the inmates of the female ward showed signs of the same condition and the whole of the patients and ward staff were in turn attacked. Four visitors to the ward suffered similarly. One of the nurses went home on a visit and four days later her father and a relative were attacked. One of the patients from the same ward entered a home in Clifton and after a few days four other servants were prostrated. There was then a lull of 14 days succeeded by a final outburst of 12 cases. From the clinical notes of the cases it is apparent that the symptoms in most cases were typical of bacillary dysentery



with blood and mucus in the motions. The stools were examined bacteriologically in 9 cases. In one which contained pus, mucus and blood, *B. dysenteriae* Y was recovered and also in another which contained pus and mucus but no blood. From seven other samples not containing pus, mucus or blood *Bac. Y* was not recovered. The sera of two cases from which *Bacillus Y* was recovered agglutinated *Bac. Y* in 1 in 50 to 1 in 125. Also similar titres were got in three cases from which *Bacillus Y* was not recovered. *B. pyocyaneus* was present in one case in which *Bacillus Y* was not found.

J. C. G. L.

**ALTER. Ruhrähnliche Darmerkrankungen.** [Dysenteroid Conditions.] —*Deut. Med. Woch.* 1915. Jan. 28. Vol. 41. No. 5. pp. 136–137.

A description of two outbreaks of institutional dysentery which like that recorded by LESCHE [this *Bulletin*, Vol. 6, p. 72] was clinically indistinguishable from true dysentery but bacteriologically dissimilar. The outbreak of 1911 was not severe. It was however accompanied by tenesmus, blood and mucus in the motions and slight pyrexia. Generally the symptoms disappeared in 1–3 days. Neither *B. typhosus*, *B. paratyphosus* nor *B. dysenteriae* was found in stool or blood. In two cases streptococci were recovered from the blood. The outbreak of 1914 was somewhat more severe. As before, neither typhoid, paratyphoid nor dysentery bacilli could be cultured from blood, stools or urine, but from the blood and catheter samples of urine streptococci were isolated. In one fatal case in a lunatic patient, foci of slight haemorrhagic nephritis were found along with streptococci, which were also recovered from the liver and spleen. Two similar cases came to autopsy in which streptococci were cultivated from kidneys, liver, spleen, and heart blood. This "Pseudodysentery" was also found to be associated with sore throat or tonsillitis or enlarged cervical lymph glands, a point to which LESCHE had drawn attention. The writer thinks this form of "Pseudodysentery" is really to be regarded as a subacute septicaemia proceeding from a catarrhal pharyngitis. [Mannite-fermenting *B. dysenteriae* have been so constantly associated with dysentery of the insane that these findings must at present be accepted with considerable reserve.]

J. C. G. L.

**JUSTI (K.). Ueber Pyozyaneuserkrankungen, insbesondere des Darmes.** [Infections with *B. pyocyaneus* specially of the Gut.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1915. Sept. Vol. 19. No. 17. pp. 458–470.

The writer discusses the rôle of *B. pyocyaneus* in the excreta of children suffering from dyspeptic conditions, malnutrition and certain forms of enterocolitis and dysentery. Though the organism has been met with by numerous workers in the stools of dysentery patients, either alone or in association with *B. dysenteriae*, it has not hitherto been regarded as playing any definite etiological rôle. From a review of the literature however, the writer believes that genuine cases of *Pyocyaneus*-dysentery do occur, which are accompanied by greenish

evacuations containing blood and mucus, and also tenesmus. In polluted wells *B. pyocyaneus* is frequently found and in the tropics, where water supplies not uncommonly come under suspicion, the possibility of *B. pyocyaneus* acting as an exciting cause of enteritis and dysentery should be borne in mind, especially when search for other known causes has failed.

J. C. G. L.

GHON (A.) & ROMAN (B.). *Ueber Befunde von Bacterium dysenteriae Y im Blute und ihre Bedeutung.* [Finding of *B. dysenteriae* Y in the Blood and its Significance.]—*Wien. Klin. Woch.* 1915. June 3. Vol. 28. No. 22. pp. 579–583; June 10. No. 23. pp. 620–624.

It is generally agreed that *B. dysenteriae* does not give rise to a septicaemia, but there are on record not a few instances in which the bacillus has been recovered from other regions of the body than the intestinal tract, e.g. heart blood, spleen, lymph glands, liver and bile. These exceptions do not materially alter the rule on the subject. The writers record an interesting series of cases in which this exceptional occurrence was observed. The cases are arranged in two groups:—

Group I (two cases). (1). Fatal case of acute haemorrhagic pseudo-membranous ulcerative colitis in a child 9 days old. *B. dysenteriae* “Y” was recovered from the spleen. (2). Fatal case of asylum dysentery in a man aged 66 years. *B. dysenteriae* “Y” was recovered from the spleen and the bile but not from the large bowel.

Group II. In this group of about a dozen cases the clinical picture was by no means definite. In some the picture was typhoid-like, while in others it was impossible to hazard any diagnosis. From the blood of every case however *B. dysenteriae* “Y” was recovered during life.

The clinical histories of one or two of these cases may be quoted.

Case I. Soldier (age 23), 7th February, 1915, had attack of bronchitis in the Carpathians. Came to Reserve Hospital on 21st February where a diagnosis of diffuse bronchitis and vasomotor neurosis was made. From 21st February to 17th March the temperature remained under 37° C. except on two days. The stools were normal.

On March 18th temperature rose suddenly to 38°·6 with sweating and severe headache, also a roseolar rash on the buttock. Enteric fever was suspected but after a short time the temperature fell and the patient recovered. *B. dysenteriae* Y was recovered from the blood on 19th March. On 19th April neither typhoid, paratyphoid nor dysentery bacilli could be isolated from the stools but *B. dysenteriae* “Shiga” was present in the urine.

Widal tests on 19th April and 8th May showed a slight reaction with *B. dysenteriae* Y (1 in 20 to 1 in 40).

Case II. Typhoid suspect. Spleen enlarged and stools of pea soup character. Stools negative for typhoid, paratyphoid and dysentery bacilli. Serum agglutinated *B. typhosus* weakly in 1 in 80, *B. paratyphoid* (B) weakly in 1 in 20, *B. dysenteriae* Shiga in 1 in 20 and *B. dysenteriae* Y in 1 in 40.

In two other cases with typhoid stools roseolar rash and enlarged spleen, *B. dysenteriae* Y was recovered both from the blood and from the motions.

A satisfactory explanation of the findings cannot yet be brought forward. It is suggested that in a majority of the cases enteric fever was the primary disease, while bacillary dysentery was either mixed with it or occurred as a secondary infection. In other cases, bacillary

dysentery appeared to have been the chief infection with enteric as the secondary. [If enteric was the chief infection, it is difficult to understand why *B. typhosus* was not recovered also from the blood, at least in some cases.] The further suggestion [a very probable one] made is that these cases were really dysentery carriers, in whom just as in typhoid carriers there may be a liability to occasional invasion of the blood stream by bacilli vegetating in the intestinal tract.

[These cases are of great interest at the present time when dysentery and typhoid disease are prevalent in the field and they deserve the most careful bacteriological investigation. The reviewer and his colleague (PENFOLD) have recently recovered *B. dysenteriae* "Shiga" from the blood during a so-called relapse (pyrexial exacerbation) in a case of Paratyphoid (A) fever. *B. para. (A)* was recovered from the blood during the initial pyrexia.]

J. C. G. L.

**GALAMBOS (Arnold).** Ueber das gleichzeitige Auftreten von Typhus abdominalis und Dysenterie. [The Concomitant Occurrence of Typhoid and Dysentery.]—*Wien. Klin. Woch.* 1915. June 3. Vol. 28. No. 22. pp. 589-590.

The occurrence of dysentery after recovery from typhoid was noted by the author in 41 cases, the commencement falling generally in the third week of convalescence. Almost pathognomonic is the change in the external appearance of the patient. The face takes on a greyish cyanosed appearance, there are deep rings round the eyes and the distal extremities are cold, thin and dry. The prognosis of posttyphoid dysentery is bad, even though the dysentery itself is not severe. The disease runs an afebrile course and yet complications like pneumonia and abscess of the lung may coexist. The simultaneous appearance of typhoid and dysentery was observed in nine cases, all but one ending fatally. The chief complication in this form of mixed infection is gangrene of the extremities (present in six out of nine cases), a complication noted also in three of his posttyphoid dysenteries and in two of his 15 cases of postdysenteric typhoid [see below.] The gangrene affected the lower extremities as a rule and began with paraesthesia. The diseased spots became cold and oedematous and the distal parts cyanotic and finally gangrenous. In many cases death occurred before final mummification. Cases of post-dysenteric typhoid numbered 12 to 15, the prognosis here being much more favourable than in the two previous types. [Bacteriological investigations in such cases would be of great interest.]

J. C. G. L.

**SOLDIN (Max).** Widalsche Typhusreaktion bei Y-Ruhrkranken. [Widal's Reaction in Y-Dysentery.]—*Deut. Med. Woch.* 1915. July 15. Vol. 41. No. 29. pp. 858-860.

The author discusses the question of positive typhoid Widal findings in cases of bacillary dysentery and gives a series of cases in which such reactions were obtained. It is at the commencement of the dysentery infection (due to type Y) that the positive typhoid Widal may be

obtained. After a few days it disappears or is very markedly weakened, when the specific agglutinin development to *B. dysenteriae* Y can now be demonstrated. This specific reaction, as is well known, may not be obtainable in the early days of the dysentery infection.

J. C. G. L.

MAREK (Richard). **Positive Typhusreaktion bei Ruhr.**—*Wien. Klin. Woch.* 1915. May 20. Vol. 28. No. 20. pp. 530-533.

Several papers have recently appeared in which attention has been drawn to the occurrence of positive typhoid and paratyphoid Widal reactions in cases resembling clinically bacillary dysentery. The author gives his experience on this question and records notes of 17 cases, all of which with one exception gave a clinical picture in no way suggesting a typhoid infection. Many of the cases were passing blood and mucus while others were suffering from a dysenteric relapse. In all the agglutination for *B. typhosus* was positive and for *B. dysenteriae* [? Type] negative (with one exception). [We are not told at what date the agglutination test was performed or what the test organism was.] Though the stools in most cases contained mucus, dysentery bacilli appear to have been recovered only from two cases. The exceptional case was one in which no dysentery organisms were found in the stools, which contained no mucus or blood. The disease ran a febrile course and the patient was transferred to a typhoid ward. In this case the serum agglutinated *B. dysenteriae* in 1 in 100 (+++) and also *B. typhosus*. [If this case is really to be considered one of enteric, as the author says, why is this the only one of the series in which the serum gives a positive agglutination for *B. dysenteriae*?] His results lead him to the conclusion that in many cases of dysentery the bacteriological and serological investigations are apt to miscarry and that therefore the diagnosis must rest on clinical grounds.

The author however believes that anomalous reactions of this kind may be explained on the basis of a mixed infection. [This is very probable. At the present time in the field, where dysentery and typhoidal disease are both prevalent, evidence of mixed simultaneous infections or of secondary infections arising in the convalescent stage of the primary has come from many sources.]

None of his cases had been inoculated against enteric. The rest of his paper is devoted to a very unconvincing argument in which he seeks to show that "certain organisms which can produce dysentery are morphologically or biologically allied to *B. typhosus*." This comforting assumption would explain why he was unable to isolate *B. dysenteriae* from his cases and would also explain, on the theory of group agglutination, the positive typhoid Widal. [The question as to the value to be attached to serological tests in diagnosis of typhoid and dysenteric affections is a very important one, and the work on which conclusions are based ought to be of the most careful character with plentiful controls. There is no doubt that the best guide to diagnosis is the demonstration of the actual invading organism and on this object most attention should be concentrated.]

J. C. G. L.

**BRYSON (J. G.). Clinical Aspects of Bacillary Dysentery in Texas.**—*Texas State Jl. Med.* 1915. May. Vol. 11. No. 1. pp. 36-38.

A clinical lecture on bacillary dysentery as it exists in Texas. Apparently the writer is able to detect *B. dysenteriae* (Shiga) by microscopical examination of a Gram stained film of mucus from the dejecta! Dietetic treatment and various methods of drug therapy are described, including saline bowel washes containing 1 in 4,000 or 1 in 5,000 HgCl<sub>2</sub>, or silver nitrate (20 grains to the quart of sterile warm water). Serum therapy is not referred to. The course of the disease is usually from 12 to 30 days, but the most severe cases usually terminated in death during the second week.

J. C. G. L.

**REMLINGER (P.) & DUMAS (J.). Insuffisance surrénale au cours de la dysenterie.**—*C. R. Soc. Biol.* 1915. Aug. Vol. 78. No. 14. pp. 433-435.

The "acute suprarenal syndrome" (very different from the Addisonian syndrome) has in recent years been observed in a large number of infections and intoxications. The authors have noted it in 4 per cent. of cases of bacillary dysentery observed in the Argonne in the winter of 1914-15. The diagnosis has been verified at autopsy by the presence of hypertrophy of the adrenals and by the absence of other lesions capable of accounting for the symptoms observed during life. This syndrome appears in benign as well as in severe cases and at any period of the course. The appearance of the patient changes completely—sunken eyes, pinched nose, peculiar bluish colouration of skin, great emaciation, hands and feet and face of violet tint like that seen in cholera, frequent and often scarcely perceptible pulse, dry tongue, extreme thirst, nausea and vomiting, abundant and very liquid stools, etc. The nervous system is also affected. The patient is inert, apathetic, and semi-somnolent, sometimes very restless and turning from side to side in bed. He may even try to get out of bed. At autopsy one finds nothing very obvious apart from the intestinal lesions and hypertrophy of the mesenteric glands. The spleen is small, hard and contracted and the heart is dilated. The suprarenals alone attract attention. They are considerably hypertrophied (two to three times the normal volume). Histologically there is congestion of the capillaries and diffuse coagulation necrosis affecting both the cytoplasm and the nuclei of cells. The lesions recall those found after injection of diphtheria toxin and are due probably to a direct action of the dysentery toxin on the suprarenal capsule.

J. C. G. L.

**VON GROER (F.). Ueber die Behandlung der bazillären Dysenterie mit Adrenalin.** [The Treatment of Bacillary Dysentery with Adrenaline.]—*München. Med. Woch.* 1915. Apr. 6. Vol. 62. No. 14. pp. 487-489.

The writer strongly recommends the use of adrenalin, which proved in his experience the most valuable agent in the symptomatic treatment of bacillary dysentery. Administered per os it appears to have a

remarkable sedative influence on the abdominal pains and the tenesmus and its effect on the general condition is equally marked. Unlike the opiates, it may be given with perfect safety; 10–20 drops of adrenalin (Suprarenin Höchst or Adrenalin Takamine in 1 per 1000 of the commercial solution) every hour or every two hours. It may also with great advantage be administered in enema form (2 litres of a 1 in a million or 1 in half a million solution) in physiological saline warmed to 40° C. The enemas are given in the knee-elbow position or in the lateral position (in severe cases) with the help of a soft stomach sound, at least 1 meter long and about 8 mm. thick. Some minutes before giving the enema, it is wise to administer 20 drops of adrenalin by the mouth. These adrenalin enemas have a remarkable effect in checking the loss of blood from the bowel, in restoring the normal character of the motions and in improving the general condition of the patient.

J. C. G. L.

SCHMIDT (Ad.). **Prophylaxe und Therapie der Ruhr im Felde.** [Prophylaxis and Treatment of Dysentery in the Field.]—*München. Med. Woch.* 1914. Sept. 8. Vol. 61. No. 36. pp. 1917–1920.

In war, every case of diarrhoea accompanied by tenesmus should be reported. If the motion is bloody or mixed with blood and slime, the soldier should be reported sick and isolated as soon as possible. It is not advisable to wait for bacteriological results. Stools and body linen should be disinfected and care should be taken to keep flies away both from the patients and their excreta. Polyvalent dysentery serum should be given as early as possible. As a rule three doses spread over three days are sufficient. The fever diminishes and there is a marked improvement in the general condition as gauged by the pulse. A small and frequent pulse even with low temperature and comparatively slight local symptoms is prognostically unfavourable. Frequent vomiting is also unfavourable. Serum therapy has a less pronounced action on the tenesmus and the diarrhoea. To combat these, bolus alba or decoction of Simaruba should be given. Emetin is of no value in bacillary dysentery. The author strongly disapproves of calomel or castor oil in early cases. [On this particular point there appears to be an extraordinary diversity of opinion.] Enemata containing tannin or iodoform are also inadvisable as they are not retained and are painful. On the other hand, small suppositories containing extract of belladonna with opium are useful. In collapsed cases, camphor and saline infusions are recommended. Patients should not be discharged too early as there is always the danger of relapse. Moreover the carrier condition should be kept in view.

J. C. G. L.

NOC (F.). **Vaccinothérapie de la Dysenterie bacillaire et des Diarrhées chroniques.**—*Bull. Soc. Méd. Chirurg. Indochine.* 1915. May. Vol. 6. No. 6 pp.

In the treatment of acute and subacute dysentery Noc employs the following procedure. On the first day serum is given, the dose varying according to the severity of the case, and on the next day vaccine

treatment is begun, the injections being made intramuscularly. The vaccine is a mixed one and is thus prepared: 24 hour cultures of *B. dysenteriae* (Shiga) and *B. dysenteriae* (Flexner). on peptone agar (one culture of each) are emulsified each in 20 cc. physiological saline. They are not otherwise standardised as, in the author's experience, this dilution (one slope in 20 cc.) gives emulsions which in the quantity administered are not calculated to produce severe local or general reactions. The emulsions are heated at 51° for an hour. Other types of dysentery bacilli may, if considered necessary, be added to the vaccine and autogenous vaccines are also to be recommended. The first dose of the mixed vaccine, viz.,  $\frac{1}{4}$  cc., may be given without danger. A second dose of  $\frac{1}{4}$  cc. is given three days later and a third dose of  $\frac{1}{2}$  cc. may be given four days after the second. As a rule satisfactory results can be obtained after one or two injections. Albuminuria is not a contraindication to vaccine-therapy but, if pyelonephritis or old cystitis is present, it is advisable to commence with a smaller dose (e.g.  $\frac{1}{10}$  cc. of the mixed vaccine).

Useful though less rapid effects can be got in mixed amoebic and bacillary infections, where the object is to destroy pseudodysentery bacilli on which the amoebae thrive.

J. C. G. L.

MOSBY (Wm. L.). *Treatment of Dysentery.*—*Kentucky Med. Jl.* 1915. July 1. Vol. 13. No. 8. pp. 342-344.

A clinical lecture on the treatment of bacillary dysentery, from which the following notes have been extracted. Incidentally the author mentions that prophylactic vaccination gives immunity lasting 8-10 weeks. The first dose of the killed bacillus is  $\frac{1}{2}$ -1 million or more, and a second is given two to three days later containing a double quantity. [The author does not state whether the vaccine is prepared from Shiga or Flexner bacilli or both.]

In acute cases no food is given for 24-48 hours. Afterwards, broths are given or albumen water, barley water or rice water. Milk is prohibited in acute cases as encouraging intestinal fermentation. If the patient is seen early, a non-irritating purge such as Rochelle salts or castor oil with sod. bicarb. is recommended. Should these fail to purge an enema of normal saline or olive oil may be given. Bismuth in 20-60 grain doses is very useful and turpentine is also of value as an intestinal antiseptic. Irrigation of the colon is practised with alum (one teaspoonful to the pint of water with 30 drops of Tinct. Opii) or tannin (2-3 per cent. solution), boric acid (5 per cent. solution), salicylic acid (2 per cent.), nitrate of silver (1 in 5,000 to 1 in 500) but it should be preceded by rectal suppository of cocaine, morphine or opium with belladonna.

He has no personal experience of serum treatment but believes it is of great value in reducing mortality from bacillary dysentery. Vaccine treatment has not been encouraging.

J. C. G. L.

**ROUBITSCHKE & LAUFBERGER. Zur Behandlung der Dysenterie-Rekonvaleszenten.** [The Treatment of Dysentery Convalescents.]—*Therap. Monatshefte.* 1915. June. Vol. 29. No. 6. pp. 327-330.

Before leaving hospital, the stools of convalescent dysentery cases are examined three times at intervals of a week. If negative, the patient is sent to a convalescent home. These convalescents must be carefully looked after. They have lost much in weight and complain usually of dyspeptic troubles. Many cannot tolerate meat or fat. In 100 cases to which test meals were administered, 50 showed a diminution of the free HCl and of the total acidity. Subjective symptoms such as fullness in the stomach region after meals, vomiting and frequent stools were prominent. The evacuations were 3-4 daily, foul smelling, and of pea-soup character and often contained gas bubbles and slime. The reaction of the stools was usually acid. So far as the diagnosis could be established by agglutination tests with the patients' sera, 34 per cent. of the cases were due to *B. Flexner* and 13 per cent. to *B. Shiga*. The latter cases were always more severe both in the acute and chronic stage. Rheumatism occurred as a complication in 10 per cent. of the cases. In one case acute jaundice developed and in three per cent. typhoid fever developed during the convalescence from dysentery. The subacidity of the stomach contents may have been due to pushing of the bolus and animal charcoal therapy, because in cases which received dysentery serum early this subacidity did not develop nearly to the same extent. Very helpful in this form of dyspepsia was Pancreon (Rhenania) in tablets of 0.25 gm., three tablets being taken at the midday meal; 25 drops of dilute hydrochloric acid in a wine glass of water were given half an hour after eating.

A sample diet sheet for these cases is as follows :—

1st breakfast.	200 cc. tea or cocoa, 1 roll.
2nd breakfast.	$\frac{1}{2}$ litre of milk.
Midday meal.	200 cc. soup (without fat) containing vermicelli or macaroni or rice. 120 gm. minced veal or beef. 250 gm. potato or carrot purée. 300 gm. boiled macaroni or vermicelli.
Tea	200 cc. tea or cocoa, 1 roll.
Evening meal.	Twice a week, 7 dkg. thin ham. On other days, 300 gm. vermicelli, groats or rice in milk.

The caloric value of this diet is 2,200. In spite of its low value, the weekly increase of weight averaged 490 gm.

*Shiga* infections ran a much more chronic course than *Flexner* infections and were more subject to troublesome sequelae.

J. C. G. L.

**BROSCH. Ueber die Kriegsbrauchbarkeit einer neuen Methode der Ruhrbehandlung.** [The Employment in War of a New Method of Treatment of Dysentery.]—*Wien. Med. Woch.* 1915. Apr. 10. Vol. 65. No. 15. pp. 634-635.

Description of a new method of treating bacillary dysentery by the aid of an automatically acting bowel washer (Enterocleaner. Patent Enterocleaner Co. Vienna). For use in war time the method requires simplification. The patient lies partly on his side and partly on his



abdomen, in which position a negative abdominal pressure is caused and the capacity of the intestine is consequently increased. A reservoir of 40 litres suffices for two patients in adjoining beds, the wash water being recovered in a large vessel placed between the beds. The wash fluid consists of either Ringer's solution, or Bolus alba suspension (200 gm. to 20 litres of water) or Hexamethylenetetramin (10:20,000). In fresh cases of moderate severity a single wash out often suffices to bring the number of stools down to one or two within 24 hours, while slight cases may have no stools at all in the following 24 hours. Some very severe cases resisted this treatment. In such, washes containing alcohol and tannin ( $\frac{1}{2}$  per cent. salt solution to which was added 5 per cent. alcohol and  $\frac{1}{2}$  per cent. tannin) gave the best result.

Altogether 1,358 cases (*B. dys. Flexner* in all) were treated with no death, whereas before this method the mortality had been 5 per cent. Clinical cure is not synonymous with freedom from the bacilli. In 241 cases, partly acute and partly chronic, the bacilli could not be isolated from the stools after the first or second washing. In 90 cases 6-10 washings were necessary and a still longer period was required in the case of 24 obstinate convalescent carriers.

Eleven cases of enteric fever (bacteriologically diagnosed) were treated by the enterocleaner and ran a remarkably light course.

J. C. G. L.

**DOPTER. Prophylaxie de la Dysenterie bacillaire.**—*Paris. Méd.* 1915. July 24. Vol. 5. Nos. 11-12. pp. 203-206.

This paper deals only with the sanitary measures to be taken in handling cases of dysentery and suspects, the question of isolation, the bacteriological examination of excreta, disinfection of latrines, purification of water supplies, the preservation of meat and food stuffs from contamination by flies, the hygiene of the canteen, the protection of the soldier against cold, the supply of proper food, use of incinerators, etc., etc.

Cases should not leave hospital until the stools are free from *B. dysenteriae*. Dysentery suspects should be treated like cases but, if possible, in a separate ward until the diagnosis is confirmed by clinical and bacteriological investigation.

J. C. G. L.

**PRIBRAM (Ernst). Die Aufgaben des Bakteriologen bei der bazillären Dysenterie.** [The Task of the Bacteriologist in Bacillary Dysentery.]—*Wien. Med. Woch.* 1915. May 22. Vol. 65. No. 21. pp. 826-830.

The writer discusses the rôle of the bacteriologist in war time with special reference to bacillary dysentery and the necessity of examining samples of stools on a large scale. Matters of purely bacteriological interest must be postponed to a future time. It is sufficient for him to know how he can best help the clinician and on the other hand he must see that the clinician confines himself to questions that are of strictly practical interest. Plating methods, in his opinion, are

troublesome in dysentery as other organisms get into the intestine which, though not the cause of true dysentery, may produce similar clinical symptoms. [What these organisms are is not specified.] It takes a few days before differentiation and identification of members of the dysentery group can be effected. Troubles also arise in the application of fermentation and agglutination tests, especially in the case of atypical varieties. Consequently, bacteriological examinations if exactly carried out do not always meet the clinical requirements fast enough. What does the clinician want to know? He wants to know (1) whether he has to do with an infectious disease or a simple catarrh of the large intestine, and (2) whether he should give serum or not. The clinician should not wait until the type of dysentery bacilli present is ascertained. He should give the first injection of serum as soon as possible. The bacteriologist should work on a uniform prescribed scheme.

J. C. G. L.

MORGENROTH (J.). **Trockennährböden nach Doerr zur Typhus- und Dysenteriediagnose.** [Doerr's Nutrient Media for the Diagnosis of Typhoid and Dysentery.]—*München. Med. Woch.* 1914. Dec. 8. Vol. 61. No. 49. p. 2355.

In war time the difficulty of securing skilled laboratory assistants is notorious and the manufacture of nutrient media is hampered. Morgenroth recommends the use of dried media in tablet form (Endo, Conradi-Drigalski, etc.). The tablet is powdered, the correct amount of water added to dissolve and the fluid finally boiled over the flame and poured on the plate. Such media are not inferior to media prepared in the ordinary way by skilled assistants. [In this country dried or tablet media have been procurable for a considerable time.]

J. C. G. L.

FALTA (W.) & KOHN (Henriette). **Zur Frage der Variabilität von Dysenteriestämmen der galizisch-russischen Epidemie (Herbst 1914).** [The Variability in Dysentery Strains from the Galician-Russian Epidemic; Spring, 1914.]—*Wien. Klin. Woch.* 1915. June 3. Vol. 28. No. 22. pp. 583-589.

The writers examined the excreta of 48 cases of dysentery—mainly soldiers. Only in a few cases was *B. dysenteriae Shiga* recovered. In a large group of cases giving typical clinical symptoms they recovered no non-lactose fermenters on the Drigalski plates, a circumstance which led them to pay attention to the red colonies (gas formers). These gave gas in glucose and lactose and produced indol. Some of them were agglutinated highly by Shiga and Flexner serum. Specific sera prepared from certain of these gas forming types agglutinated only the homologous strains [like many *B. coli* sera]. The authors cannot come to a definite conclusion with regard to these strains. They were very toxic to laboratory animals. By passage through white mice and rabbits their true Shiga strains were apparently converted into gas formers [a very difficult and fallacious form of experiment]. They were blue and, later, red on Drigalski. [In all probability

they were dealing with late lactose fermenters or *B. coli mutabile*.] In summarising their paper they state that in the majority of their cases they got paradysentery strains of very variable character with all transitions between dysentery and coli races. Red colonies on the plates should not be neglected in the search for *B. dysenteriae*. [On the whole a very unconvincing paper.]

J. C. G. L.

**MISSIROLI (A.).** La reazione termoprecipitante nella diagnosi della dissenteria bacillare. [The Thermoprecipitin Reaction in the Diagnosis of Bacillary Dysentery].—*Polichinico. Sez. prat.* 1915. Oct. 3. Vol. 22. No. 40. pp. 1339–1340.

The author finds that from 24 hour broth cultures of dysentery bacilli he can obtain thermostable precipitogen extracts, which give precipitates with the sera of animals immunized with *B. Shiga-Krusei* and more weakly with those immunized with *B. Flexner*, though with *B. Strong* the result is negative. The author thinks that this result may prove practically useful for diagnostic purposes in the following way. If a flake of mucus from the stools of a dysentery patient, containing dysentery bacilli in nearly pure culture, is rubbed up with 4 to 5 volumes of physiological salt solution and is then heated in the oven at 100° for 10 to 15 minutes, it will give the above sero-reaction or not, according to the particular bacillus present.

J. B. Nias.

**KESAVA PAI (M.).** An Investigation into the Bacteriology of Dysentery in the Madras Lunatic Asylum.—*Indian J. Med. Research.* 1915. July. Vol. 3. No. 1. pp. 149–165.

The writer commences with a brief review of the aetiology of dysentery in the civil population of India and in institutions such as jails and lunatic asylums. Bacillary dysentery is not so common as the amoebic form. FORSTER isolated dysentery bacilli from 81 out of 128 cases of dysentery, *B. Shiga* predominating, while WELLS, in the Hazaribagh Central Jail, isolated only 14 strains of dysentery bacilli from 268 cases (4 *Shiga*, 9 *Flexner*, 1 *Y*). Similarly among the civilian and military population of Bombay GREIG and WELLS found that only 13 out of 585 cases were bacillary in origin (4 *Shiga*, 9 *Flexner*). The writer has made a similar enquiry at the Madras Lunatic Asylum and out of 136 cases examined during the period January 1911–December 1914, succeeded in isolating dysentery bacilli in 54 (18 *Shiga*, 36 *Flexner*). The 18 *Shiga* strains behaved alike on all the carbohydrates tested. On the other hand the mannite-fermenting strains, grouped as *Flexner* or *Y* according to the indol tests, showed variations in each group, especially towards maltose and raffinose. A series of agglutination reactions was carried out with the sera of patients at different stages after the acute attack (macroscopic sedimentation test of WRIGHT, in capillary tubes) but the results were disappointing and great difficulty was experienced in reading the results. On the whole, the titres obtained were very low. The polyvalent antidysentery serum of the Lister Institute was found of great service in the diagnosis of the strains isolated from the cases.

Relapses were noted in several asylum cases and in two such the organism causing the relapse was not identical with that which caused the primary attack.

The writer attempted prophylactic vaccination with a polyvalent vaccine prepared from all the strains recovered. The vaccine consisted of *Shiga* strains and *Flexner* strains in the proportion of 2:1 and was given in doses of 250 million and 1,000 million. So far, however, the results have not been encouraging and the author thinks it doubtful "if lasting antibacterial immunity against dysentery can ever be established either naturally or artificially."

[Some notes of the author's experience with regard to the local and general reactions following the vaccine would be of great interest.]

J. C. G. L.

BUSSON (Bruno). *Immunisierungsversuche gegen Dysenterie mit Toxin - Antitoxingemischen.* [Immunisation Experiments in Dysentery with Mixtures of Toxin and Antitoxin.]—*Wien. Klin. Woch.* 1915. Aug. 12. Vol. 28. No. 32. pp. 853-856.

Active immunisation against bacillary dysentery (type *Shiga*) has not hitherto been a very successful or practical measure owing to the severe local and general reactions following the inoculation of the killed bacilli. During the Russo-Japanese war *SHIGA* employed as a prophylactic dysentery bacilli with antidysentery serum simultaneously injected. *DORTER* has recommended sensitised vaccines and has published some experimental results with this method in mice. The writer has carried out a series of experiments on rabbits with dysentery toxin given (1) alone, (2) in conjunction with dysentery antitoxin in excess, (3) in conjunction with dysentery antitoxin just sufficient for neutralisation, and (4) in conjunction with dysentery antitoxin insufficient for complete neutralisation of the toxin. After immunisation the degree of immunity of the surviving animals was tested by the multiple lethal dose method. The results showed that the under-neutralised mixture (in which free toxin was present) was the most satisfactory method both from the point of view of mortality occurring during the course of immunisation and of the degree of immunity finally attained. Neutral or over-neutralised mixtures do not confer immunity and apparently if immunity is to be obtained there must be free toxin in the mixture. A small amount only is sufficient, while the addition of the serum obviates the severe local and general reactions that would follow the injection of toxin alone. The method may be found of practical value in man. It is founded on the principle developed by *BEHRING* in his prophylactic vaccine for diphtheria.

J. C. G. L.

#### FLAGGELLATE DYSENTERY.

BARLOW (Nathan). *Craigiasis.*—*Amer. Jl. Trop. Dis. & Prevent. Med.* 1915. May. Vol. 2. No. 11. pp. 680-702.

The author's researches have been conducted at Cuyamel, Honduras. He writes:—"In February of 1914, while studying intestinal infections in Honduras, it was noticed that certain of the cases presenting symptoms of chronic diarrhoea, or mild dysentery, had in the faeces an

actively motile flagellate, which did not correspond to the descriptions of *Cercomonas* or *Trichomonas* and which repeated observation, under an immersion lens, at the time when motion was becoming sluggish and ceasing, demonstrated to have but one flagellum." The flagellate was found to belong to the genus *Craigia*.

"Craigiasis is a diseased condition of the body, produced by infection with protozoa belonging to the genus *Craigia*, Craig, 1908, emend. Calkins, 1913." Fifty-six cases were studied. Five were due to *Craigia hominis* and the remainder were infected with a new species, *Craigia migrans*.

The author briefly recapitulates the life-cycle of *Craigia hominis* as given by CRAIG, thus:—"In the amoebic stage, the organism reproduces by simple division as a typical amoeba for several generations, as long as conditions are favourable. It then encysts, and within the cyst are developed numerous small swimmers which, on escaping, develop a single flagellum; reproduce by longitudinal division for several generations, after which the flagellum disappears, and the amoebic stage of development is again entered." The young forms possess a spherical body  $3\mu$  to  $6\mu$  in diameter. The fully developed flagellates measure  $10\mu$  to  $20\mu$  in diameter, and have one flagellum, a spherical nucleus and an accessory nuclear body. The amoebae vary from  $10\mu$  to  $25\mu$ , averaging  $18\mu$ . When encysted, they measure about  $15\mu$  in diameter.

"The life cycle of *C. migrans* differs from that of *C. hominis*, in that instead of dividing for a while as an amoeba, then encysting, forming swimmers, and dividing for a while as flagellates, each flagellate on attaining full development becomes an amoeba without dividing, and each amoeba encysts and produces a number of flagellates. This organism may have to be placed in another genus eventually." In other respects the life history resembles that of *C. hominis*. The young spherical forms measure  $3\mu$  to  $7\mu$  in diameter. The flagellum of *C. migrans* stains more deeply than that of *C. hominis* and has a peculiar banded appearance. The amoebic stage varies from  $12\mu$  to  $30\mu$ , averaging about  $20\mu$ . There is no accessory nuclear body present. Encysted amoebae average about  $18\mu$ . "The young swimmers are somewhat larger than those of *C. hominis*, the usual size being about 5 microns. The cysts, therefore, contain from 20 to 30 young forms. The most of the round forms in the cysts of *C. hominis* are about  $3\frac{1}{2}$  microns in diameter, and there are 40 or more in a cyst."

The author endeavours to give points of differentiation of species of *Craigia* from entamoebae, trichomonads and allied flagellates.

"There is but little doubt that the chief source of infection is from polluted water. . . ." "A patient may carry *Craigia* for months before seeking medical aid, but the infection, although in the beginning mild and insidious, is fully as dangerous as that of *E. histolytica* to the patient, and even more so to the community, as it is much more common for a patient with Craigiasis to remain a carrier for years than is the case in entamoebiasis. . . . The only distinction between the stools of Craigiasis and entamoebiasis is that in the latter severe hemorrhages occur frequently."

The diagnosis can only be made by finding the parasites in the faeces. "The swimmers are the most conspicuous objects imaginable, and doubtless have often been seen and regarded as *Cercomonas* or

trichomonads, the amoebic forms having been taken for *E. coli* in the case of *C. hominis*, and for *E. histolytica* in the case of *C. migrans*. The clinical diagnosis is almost impossible."

"The only effective treatment was found to be either emetin, hypodermically, or ipecac, internally. The treatment should be pushed to large doses and continued for a long time."

The author gives full details of 26 cases.

There is a plate illustrating the two species of Craigia described.

H. B. F.

LYNCH (Kenneth M.). *Clinical and Experimental Trichomoniasis of the Intestine. With Cultivation of the Causative Organism.*—*New York Med. Jl.* 1915. May 1. Vol. 101. No. 18. Whole No. 1900. pp. 886-889.

The author refers to the confusion regarding the names of the species of *Trichomonas* found in man. Full details are given of a patient at Charleston, South Carolina, suffering from intermittent attacks of diarrhoea. Many trichomonads were found in a stool passed after the administration of a purge of magnesium sulphate. The parasites were pear-shaped and measured about  $13\mu$  by  $18\mu$  when fresh, and about  $16\mu$  by  $21\mu$  when fixed and stained. Four flagella were present at the anterior end and there was an undulating membrane along one side.

The trichomonads were successfully cultivated *in vitro* on bouillon acidified with about 0.05 per cent. acetic acid, and at about 30° C. Subcultures were obtained by inoculating fresh tubes every third day. It was not possible to exclude the growth of bacteria, which, after about four days, overran the cultures.

Encysted trichomonads were seen from time to time in the patient's stools, in rabbits artificially infected with the parasites, and in cultures. The flagellates were successfully transmitted to rabbits by feeding and by rectal injection of both stools and cultures.

The author sets forth his summary and conclusions at length, thus :—

"Having obtained *Trichomonas hominis* Davaine or *Trichomonas intestinalis* Leuckhart from the feces of a man suffering from an intermittent diarrhea; having cultivated the organism extensively *in vitro*, in which the life cycle was that of simple direct division with the development of cysts under conditions unfavorable to proliferation; and transmitted the infection from the human stools and from cultures, by mouth and by rectum to rabbits, with the production of a similar diarrhea, and recovering the organism from these animals; and having seen the parasite lose its characteristic form and assume a nonflagellated amoeboid appearance without undulating membrane, under the influence of certain media, having seen it recover and return to form; and having failed to keep the parasites alive, either active or as cysts in water more than a few hours, and only a few days under the most favorable circumstances of a continuous nature; we feel justified in making the following conclusions, especially in the light of the previous report concerning *Trichomonas vaginalis*.

"1. *Trichomonas* is a definitely pathogenic micro-organism.

"2. The intestinal form produces a mild enteritis manifested by an intermittent diarrhea.

"3. Infection by this organism may occur by mouth or by rectum, more naturally by mouth, from active forms in rabbits, but probably from encysted cells in human beings.

"4. The duration of the infectivity of water containing either active trichomonads or the encysted is probably not long.

"5. The form of the cell may be so altered by environment as to render immediate recognition difficult.

"6. This organism is capable of artificial cultivation, this having been accomplished.

"7. It multiplies by direct cell division, this with the transformation into encysted form which may again become active, constituting the life cycle of the organism.

"8. Rabbits are susceptible to experimental infection by *Trichomonas*."

H. B. F.

CHATTERJEE (G. C.). On a Five Flagellate *Trichomonas* (N. Sp.) Parasitic in Man.—*Indian Med. Gaz.* 1915. Jan. Vol. 50. No. 1. pp. 5-7. With 1 plate.

The parasite described by the author was found in stools of six cases of chronic dysentery in India. "The flagellate in question has got five anterior flagella, one posterior "rand" flagellum, one undulating membrane—characters possessed by none of the intestinal flagellates hitherto described." The movements of the organism are colloquially described.

As regards morphology, the author states:—"The following structures were seen in stained specimens—nucleus is very big, rounded in shape, a nuclear membrane is clearly seen. Karyosome is present in the form of small clumps distributed irregularly through the substance of the nucleus. [This seems to be an unusual type of karyosome.] In many specimens nucleus is homogenous [*sic*—no karyosome can be made out. The nucleus is situated in the extreme anterior end just behind the basal granules. The flagella are six in number, five being free and directed forwards. The sixth one is a "rand" flagellum forming the border of the undulating membrane, through the length of the body and then becomes free, projecting out near the tail." The body is said to be pear-shaped, one side being usually a little more convex than the other. There is a cystotome [*sic*]. "From the basal granules are seen starting a fine chromatic line passing transversely to the opposite edge surrounding the cystotome. . . ." "In well fixed specimens stained by Giemsa, a well marked axostyle can be seen arising from the posterior part of the nucleus ending near the tail." A red blood corpuscle is stated to have been found inside the body of the organism in some cases. Rounded forms were sometimes seen. Some parasites were observed in process of division.

"The body of the organism measures 8 to 10 $\mu$  in length, 5 to 6 $\mu$  in breadth, the 4th anterior flagella [*sic*] 8 to 10 $\mu$ , the short 5th anterior flagellum 6 to 8 $\mu$ . The projecting portion of the 6th "rand" flagellum is 3 to 4 $\mu$ . The nucleus is 3 $\mu$  in diameter."

The author names the parasite *Pentatrachomonas bengalensis*, n. subgen. et n. sp. The parasite should be compared with that described by DERRIEU and RAYNAUD under the name *Hexamastix ardin-delleili* [see this *Bulletin*, Vol. 4, p. 316.] The generic name *Hexamastix* is, however, pre-occupied (Alexeieff, 1912).

[The lack of precision in the description of the organism is to be regretted. Such statements as the following may be humorous but are hardly scientific:—"In the anterior end, in slowly moving

organisms, a slight depression can be made out from which a bunch of whiskers can be seen projecting out which move spasmodically forward and backwards like the oars of a boat. The posterior end terminates in a stumpy tail." The organism is also said to be capable of "*gliding through solid faecal matters.*" (Italics not in original). Unfortunately, some of the figures are drawn from obviously distorted specimens.]

H. B. F.

CHATTERJEE (G. C.). On a *Macrostoma* found in Human Intestinal Contents.—*Ind. Med. Gaz.* 1915. Vol. 50. No. 4. pp. 135-136. With 1 plate.

The author describes a flagellate organism seen "in the dejecta of patients suffering from intestinal troubles in Bengal." Six cases were observed. There is "a capacious mouth cavity . . . extending to the middle of the body." The organism moves sluggishly. The posterior end of the body is drawn out into a long, thin tail. There is an oblique line across the body, as seen in stained preparations, which "seems to act as an undulating membrane," but "no regular undulating membrane can be made out" in fresh specimens, and no such membrane is seen in the cavity of the cystostome [*sic*].

Anteriorly, there is a vesicular nucleus. Three anterior flagella arise from basal granules, near the nucleus. No division forms and no cysts were found.

The parasite measures  $14\mu$  to  $18\mu$  in length by  $3\mu$  to  $6\mu$  in breadth. The flagella measure  $8\mu$  to  $10\mu$ . The organism is not specifically named. There is a plate of 16 figures.

[It is to be regretted that so much inaccuracy in the names of other workers and in the titles of the journals in which they published should have been overlooked in this and other recent papers by the author. Non-existent journals even have been quoted, when well known ones obviously were meant.]

H. B. F.

MAYER (Martin). Zur Frage: Emetinbehandlung der Lamblienruhr.. [Treatment of *Lambli*a Dysentery by Emetine].—*München. Med. Woch.* 1914. Aug. 4. Vol. 61. No. 31. p. 1733.

The object of this note is to correct the impression conveyed by ASSMY [this *Bulletin*, Vol. 4, p. 318] that Mayer's case for the specific action of emetine on lamblial dysentery is not established. Mayer points out that the case described by Assmy is not clinically the same as the one described by him. Further, the effect of emetine on lamblial dysentery is to be judged, not by the diminution in the number of the parasites, but by the appearance of numerous degenerating *Lambli*a in the dejecta.

H. B. F.



## MIXED AND UNCLASSED DYSENTERY.

MORISON (J.). *The Causes of Monsoon Diarrhoea and Dysentery in Poona. Second Report.*—*Indian Jl. Med. Res.* 1915. Apr. Vol. 2. No. 4. pp. 950-976. With 2 maps and 12 charts.

This is an interesting and valuable contribution to a question which in past years has frequently been the subject of inquiry without any definite conclusion having been reached. For over 30 years during the monsoon, Poona has suffered from a prevalence of gastro-intestinal disease and enteric fever. Formerly it had been regarded as one of the healthiest stations in India.

In 1904 Staff Surgeon Lt.-Col. BULL had reported that the Poona diarrhoea might be traceable to the water supply. "It was a fact that, at the commencement of the monsoon when the large catchment area of Lake Fife (from which the water is taken by canal) is scoured with water which eventually finds its way to the Poona distribution pipes, the annual increase in serious bowel complaints occurs." This statement of Col. BULL is referred to here, as it foreshadows the line along which the present writer has worked. In 1909-10-11 there was a tendency to attribute the prevalence of diarrhoea to flies. Capt. Morison began his investigations in April 1912 and the question was attacked from the epidemiological, clinical and bacteriological aspects. The clinical characteristics of Poona diarrhoea are very variable and, as the outcome of observations over two seasons, the author is inclined to include under this name every form of gastro-intestinal disturbance, from colic and dyspepsia to the most severe types of dysentery, choleraic diarrhoea and jaundice. A clue to the nature of the case distribution was got by consulting the manuscript notes on out-patients at the various hospitals.

Charts are appended showing the course of the epidemic week by week in 1912 and 1913. In 1912 the highest point of the epidemic curves was reached in the second week of July, while in 1913 the curve did not reach its acme till August 6th.

There was no evidence from the records that temperature changes bring the annual epidemic. The humidity curve, however, rose with the cases of diarrhoea but, as the author remarks, the humidity or the rain to which humidity is due has long been regarded as standing in some relationship to the Poona diarrhoea. The question of transmission by milk was enquired into, as there was a popular belief that cows feeding on new grass suffer from diarrhoea and that the milk of such cows may induce diarrhoea especially in children. No evidence in support of milk as the source of infection could be obtained and the evidence in support of flies as carriers of the infection was on the whole inconclusive. "The evidence that in Poona they convey infection to such an extent that they produce the annual epidemic is so hypothetical that it can only be accepted if every other cause is definitely excluded."

Some interesting cases of possible distribution by human carriers were met with but "in none was the chain of evidence complete."

The author then proceeded to investigate the question from the standpoint of the relation of water supply to the distribution of the disease. The only cause common to all classes of patients included in the 1912 records was the drinking water. All received piped water

from Lake Fife. Bacteriological examination of filtered tap water on June 22nd, 1913 gave coliform organisms in 0.01 cc. This filtered supply was taken from the Muttra Right Bank Canal at a point 11 miles from Lake Fife. Where the canal issued from Lake Fife, the water contained coliforms in 0.03 cc. These results were confirmed by estimations of the free and albuminoid ammonia in the water issuing from Lake Fife. Around this lake are 16 villages with a population of over 8,000. Also in the three valleys at the head of the lake are 36 villages the drainage and filth from which enter the upper reaches of the lake, where it collects if the rainfall has only been moderate. Now the flow of the lake depends on the volume of water entering the lake and the volume allowed to escape at the weir. Gauge records at the weir were taken by the irrigation department every morning and it was noted that, as a consequence of rain in the catchment area and therefore of a rise in the volume of water entering the lake, there was a sudden rise in the albuminoid ammonia. This rise announces the arrival of water scoured out from the narrows at the head of the lake. "If now polluted water from Lake Fife is the cause of the epidemic diarrhoea, an increase in the volume of water entering the lake will precede an increase in the cases of diarrhoea in Poona by a definite minimum period" (at least six days). Charts are supplied showing the water levels and the cases of diarrhoea noted on the Wednesday of the week in which they occurred.

These charts require careful study. It is impossible to discuss them here. From a review of the evidence the author reaches the conclusion "that the relation of the sewage pollution of Lake Fife to the epidemics of diarrhoea is so close and so constant that the one stands to the other as a cause to an effect." The remedy for the annual epidemics in Poona is the purification of the water supply. The water during the monsoon is only safe when boiled.

The bacteriological work consisted of examination of stools for flagellates, amoebae, dysentery bacilli and organisms of the typhoid colon group generally and, in the attempt to demonstrate pathogenicity of coliform organisms isolated from faeces, agglutination tests were made with the patients' sera. The results so obtained will be published separately and will be awaited with interest.

J. C. G. L.

FISCHER (Walter). *Ueber Stuhluntersuchungen bei Europäern und Chinesen in Shanghai*. [The Examination of Stools of Europeans and Chinese at Shanghai,]—*Arch. f. Schiff- u. Trop.-Hyg.* 1914. Sept. Vol. 18. No. 18. pp. 615-634.

The author gives an account of his investigations of stools from Europeans and Chinese in Shanghai. The period covered by the work was January to May 1914. The parasites found included various helminthes (*Ascaridae*, *Trichocephalus*, *Oxyuris*, *Strongyloides*, *Ancylostoma duodenale*, *Necator americanus*, *Schistosoma japonicum*, *Clonorchis sinensis* and *Taeniidae*), as well as various Protozoa. Fresh preparations were used, and stained ones when possible.

The protozoal organisms observed were *Balantidium coli*, *Trichomonas intestinalis*, *Prowazekia asiatica*, *Lambia intestinalis*, *Uronema caudatum*, *Entamoeba histolytica* and *E. coli*.

*Balantidium coli* was found once in an European who had lived in several tropical countries. It was never found in a Chinese.

Flagellates were found in large numbers in some cases, both European and Chinese. In two cases there was profuse diarrhoea and the stools were very offensive, *Trichomonas intestinalis* being present in enormous numbers. In another case, the stools were less fluid and malodorous, while the trichomonads were fewer in number. The flagellates were probably the causal agents of the disease.

*Prowazekia asiatica* was present in one case only.

*Lambia intestinalis* occurred in large numbers in a Chinese who also was suffering from amoebic dysentery.

*Uronema caudatum* was observed in the diarrhoeic stool of an European. Two days later, encysted forms only of the Ciliate were found in the stool.

The latter part of the paper deals with *Entamoeba histolytica*. The "tetragena" form is the one constantly encountered in Shanghai. Vegetative (trophic) forms of *E. histolytica* were found in 12 out of 180 cases in Europeans. Cysts only were found 19 times, and on four other occasions they were co-existent with trophic forms. Cysts were also present in 9 out of 100 stools of Chinese. Six cases were cyst carriers.

The two types of carriers described by WALKER and SELLARDS namely, "convalescent carriers" and "contact carriers," are recognised. Direct infection by soiled fingers, as well as by water, needs consideration, but masked cases (contact carriers) are a great source of infection.

The author states that emetine had little or no action on the cysts of *E. histolytica*, though it had a marked action on the trophic phase of the parasite.

*Entamoeba coli* was found to be relatively rare.

The author concludes with a warning regarding pseudodysentery in neurasthenic persons. Microscopical diagnosis is essential, and should be followed by appropriate treatment when the absence of Entamoebae is established.

H. B. F.

BERTRAND (L.). *Parasitisme intestinal en Cochinchine.* (Note de M. Noc.)—*Bull. Soc. Path. Exot.* 1915. May. Vol. 8. No. 5. pp. 245-247.

The author commences by stating that "statistics are the triumph of vice-versa." He cites the statistics relating to liver abscess and dysentery and to amoebic dysentery and anguillulid diarrhoea in Cochinchina in support of his statement. Twenty-five per cent. of the cases of amoebic dysentery are complicated by liver abscess. On the other hand, Bertrand and his colleague, FONTAN, found that 77 per cent. of the cases of liver abscess were preceded by dysentery, coincided clinically with it or showed that it had been present by the intestinal appearance post-mortem. Other workers also have obtained high percentages.

Noc and colleagues found the Anguillula of NORMAND 4 times out of 400 cases of dysentery or diarrhoea in Cochinchina. In each case, the Anguillula was accompanied by amoebae. It might, then, be

considered that there was, in no case, anguillular infestation without concurrent amoebic dysentery. The question to be determined really is whether in Cochinchina there is a chronic diarrhoea due to the anguillulid. NORMAND, who found the anguillula, did not give the percentage of the Cochinchina diarrhoeas which were old dysentery cases, but he recognised the frequency of "mucoso-sanguinolent stools with tenesmus" in the case of the chronic diarrhoeics. These he thought resulted from a colitis, of which he said the agent was the amoeba of the colon.

The author concluded by stating that NORMAND, after LOESCH, was the first person to describe amoebae in dysentery. He depicted them in his account, but referred to them as paramoecia.

H. B. F.

NOC (F.). *Sur le diagnostic des dysenteries et des diarrhées d'Indochine.*—Valeur du sérodiagnostic dans les diarrhées chroniques. —*Bull. Soc. Med. Chirurg. Indochine.* 1915. May. Vol. 6. No. 6. 5 pp.

In the tropics it is often exceedingly difficult to diagnose the exciting cause of the various forms of diarrhoea and dysentery. Particularly is this the case where amoebae, dysentery bacilli, flagellates, ova, etc., are liable to be present and often parasitic in the same host. Some may play a primary and others a secondary rôle. In Saigon one often finds *Lambli*a cysts or nematodes in diarrhoeal cases, even at the end of the malady when the stools are normal in character. Also one finds dysentery bacilli in cases of amoebiasis which have yielded to emetine. The presence of alterations in the total and differential leucocyte counts is of value but no specific importance can be attached to them.

Although some authors have noted eosinophilia in amoebic dysentery, the author has observed many cases of amoebiasis in which there was no eosinophilia, at least at the commencement of the malady. Agglutination tests are of great practical value, young agar cultures of *B. Flexner* being employed. The agglutinating power of the serum is feeble in acute cases but may be very strong in chronic cases. It is necessary to employ all possible diagnostic methods concurrently, viz., macroscopic and microscopic examination of the stools, search for *B. dysenteriae*, total and differential leucocyte counts, and serological tests (agglutination). It is only by thorough examination of the case from all points of view that the most probable diagnosis can be reached and the best indications for treatment arrived at.

J. C. G. L.

SMITS (Joseph). *Ueber Dysenterie und ihre Behandlung.* [Dysentery and its Treatment.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1915. Apr. Vol. 19. No. 7. pp. 195-210; No. 8. pp. 224-238.

General discourse on dysentery from experience gained in Sumatra. Propagation of the disease by flies is important and the writer states that he succeeded in isolating Shiga-Kruse organisms from flies caught in the neighbourhood of dysentery patients in the dysentery barracks (extract in sterile water of the whole fly). Amoebic dysentery is usually a chronic disease without pyrexia at the commencement, whereas the

bacillary form begins suddenly and runs a course of 15-20 days as a rule whether cure or death results. Complications noted in bacillary dysentery were suppurative parotitis, joint swellings and sometimes suppurative arthritis. Also muscle abscesses have been seen.

A leucocytosis exceeding 25,000 in severe cases of amoebic dysentery is prognostically unfavourable. Liver abscesses should be evacuated. They do not yield to emetin injections. It is possible however that hepatitis in the early stage is arrested by emetin; and he has noted much fewer cases of liver abscess since the introduction of emetin treatment.

Serum treatment should be employed in severe cases of bacillary dysentery. The milder forms of the bacillary infection are cured readily without its aid. In mixed bacillary and amoebic infections combined treatment with emetin and serum has been attempted but not with any striking success.

J. C. G. L.

**Noc (F.). Hygiène et Prophylaxie. Les dysenteries tropicales et leur traitement spécifique.**—1915. Saigon: Imprimerie Albert Portail. 8 pp.

An excellent short pamphlet on the etiology of dysentery for the instruction of the inhabitants of tropical countries. In *Shiga* dysentery energetic treatment by anti-dysentery serum is recommended from the start. The author also believes that in "pseudodysentery," due to the *Flexner* group, dysentery serum is equally efficacious, but frequent injections are necessary. Vaccine-therapy in pseudodysentery (*Flexner*) is favourably commented upon, mixed vaccines (polyvalent) and also autogenous vaccines being employed. He also suggests the possibility of prophylactic vaccination against this pseudo form.

J. C. G. L.

**MATHIEU (A.). Traitement des colites dysentériques aiguës ou sub-aiguës.** — *Presse Méd.* 1914. Oct. 15. Vol. 22. No. 71. pp. 645-646.

A note on the specific and non-specific treatment of amoebic and bacillary dysentery. In the latter the beneficent action of anti-dysentery serum is remarkable, especially when the treatment is commenced early. In connection with the non-specific treatment, special mention is made of bowel-washes containing nitrate of silver (0.25 gm.-0.30 gm. to 1 litre of distilled water). Kho-Sam (Kossam) and sulphate of soda are very favourably commented upon. The laxative action of the latter is of very great value where, as so frequently happens, hard scybalous masses occur in the stools along with blood and slime.

J. C. G. L.

GHIGOFF (B.). **Ueber die Behandlung der Dysenterie und Cholera mit Natrium sulfuricum.** [The Treatment of Dysentery and Cholera with Sodium Sulphate.]—*Wien. Klin. Woch.* 1915. Aug. 26. Vol. 28. No. 34. pp. 922-924.

The author recommends strongly the use of sodium sulphate in dysentery. He uses a 20 per cent. watery solution containing also opium (either Extractum opii aq. 0.10 to 100 cc. of the solution or simple Tinct. opii, as many drops as there are grammes of sodium sulphate in the solution).

J. C. G. L.

ASCOLI (Maurizio). **Sulla Dissenteria.**—*Riforma Med.* 1915. May 8. Vol. 31. No. 19. pp. 505-512.

A comprehensive survey of dysentery in all its aspects. The author thinks the purgative method of treatment is losing ground and that the use of absorbents (animal charcoal or bolus alba) is coming to the front.

Dysentery serum should be used early and generously in grave cases.

J. C. G. L.

SCHMIDT (A.). **Differentialdiagnose der Ruhr gegenüber anderen ähnlichen Darmkrankheiten.** [Differential Diagnosis of Dysentery and Allied Intestinal Diseases.]—*München. Med. Woch.* 1914. Vol. 61. Sept. 22. No. 38. pp. 1982-1983.

Bacteriological examinations of the stools require time while serological tests (agglutination), though capable of being quickly performed, are apt to give doubtful results at the commencement of an infection. Consequently the physician, who must know as soon as possible which cases require isolation, has to rely mainly on the clinical symptoms (character of the stools, tenesmus, etc.).

The diseases which require differentiation are such as acute infectious gastroenteritis (summer diarrhoea, acute paratyphoid infection and cholera nostras). In these the character of the stools is entirely different and tenesmus is not a prominent symptom. More difficult to separate off are the cases of simple non-specific acute colitis or the various forms of ulcerative colitis or acute proctitis.

Generally however such cases occur in isolated fashion and do not give trouble in diagnosis.

J. C. G. L.

BENEKE. **Ruhr mit multiplen Perforationen der Darmwand ohne Peritonitis.** [A Case of Dysentery with Several Perforations of the Bowel and No Peritonitis.]—*München. Med. Woch.* 1915. Vol. 62. No. 5. pp. 158-159.

The patient (female aged 53 years) died in the late stage of dysentery. Ante mortem a "pulsating tumour" was felt in the abdomen in the region of the transverse colon. No symptoms of peritonitis. At the autopsy an extremely severe dysentery of the whole colon and ileum was found. In the colon, only small portions of the mucosa remained.

Great meteorism of the greater part of the large intestine, with numerous tears in the wall so that the intestinal contents lay in immediate contact with the anterior abdominal wall. The bowel was pressed closely against the latter without any peritonic adhesions or trace of the intestinal contents having escaped. Apparently, during life, the bowel had lain motionless against the abdominal wall. Gas and not faecal matter had come in contact with the peritoneal lining of the latter so that no peritonitis occurred. Cases of this nature are very rare.

J. C. G. L.

DUTCHER (B. H.). **The Failure of Emetine Hydrochlorid, but the Apparent Success of Salvarsan, in a Case of Balantidiosis.**—*Amer. Jl. Trop. Dis. & Prevent. Med.* 1915. Apr. Vol. 2. No. 10. pp. 663–664.

The author, writing from San Juan, Porto Rico, gives an account of an infection with *Balantidium* in a soldier in the Porto Rican Infantry. Apparently the soldier did not suffer much inconvenience from the parasite. Intermittent treatment with emetine for a period of a month was unsuccessful. Salvarsan was then tried, 0.6 gm. being administered intravenously. During a subsequent period of nine and a half weeks the stools were examined on twenty days, but *Balantidia* were never found.

H. B. F.

## CHOLERA.

JOHNSTONE (R. W.). **Report to the Local Government Board on the Progress and Diffusion of I. Plague. II. Cholera. III. Yellow Fever throughout the World during the Year 1913.**—*Rep. to Local Govt. Brd. on Pub. Health & Med. Subjects.*—vi + 110 pp. 1915. London: Printed under the Authority of H.M. Stationery Office.

A thirty-six page cholera report, sixteen of which are devoted to India. At the time of compilation returns for only eleven Indian provinces were available, thus accounting for 245 of the 315 millions of the Indian Empire. In these eleven provinces 296,000 deaths took place during 1913, a mortality of 1·21 per thousand; the mortalities for the two preceding years were 1·71 and 1·48 per thousand respectively, while the average for the last 18 years was 1·73 per thousand with a sum total of over seven million deaths for that period. It is obviously the insanitary way of living and the presence of chronic cholera carriers during the herding together of large numbers of people at fairs and pilgrimages that favour the spread of the disease, all efforts on the part of the government to improve the conditions and to educate the natives as to the dangers they run appearing to have made so far no impression on the mortality statistics. Fly-borne infection is very prominently seen in the Noakhali district (Bengal). A largely consumed article of diet there is sun-dried fish which during the drying process is constantly covered with multitudes of flies. In many parts water from tanks, in which jute has been soaked, is drunk and causes a gastro-intestinal irritation predisposing to a cholera attack. In the same way the large and badly digested meals that follow the long periods of religious fasting render the Mohammedans liable to infection.

The European countries mentioned in the report are Turkey-in-Europe, Greece, the Balkans, Russia and Austria-Hungary. No cases occurred in England; a few were reported on ships bound for this country but arriving here with all on board well.

H. Schütze.

LIVIERATO (S.). i. **Studi e considerazioni dal lato della diagnosi e della profilassi de colera.** [Cholera Studies and Observations from the Point of View of Diagnosis and Prophylaxis.]—*Riforma Med.* 1914. Aug. 22. Vol. 30. No. 34. pp. 932-938; Aug. 29. No. 35. pp. 969-973.

ii. **Forma clinica e terapia specifica del colera.**—*Ibid.* 1915. June 19. Vol. 31. No. 25. pp. 673-679.

i. *Part I* (Aug. 22nd) gives a short system of differentiation between cholera asiatica and other illnesses with similar symptoms, such as cholera nostras, poisoning by various substances—arsenic, corrosive sublimate, toadstools, etc.—trichinosis and malaria perniciosa, and then a full chronological account of the acquirement of knowledge of Koch's vibrio.

*Part II* (Aug. 29th) treats of the experience of the author gained during the 1913 Balkan war in the central military cholera hospital at Salonika, of which he was in charge. His attention was chiefly given to the relationship of the agglutination phenomenon to the disease in its various aspects. The observations were carried out on



only 147 clinically and bacteriologically diagnosed cases, but the author himself recognised that too much weight could not be placed on the percentages he worked out. Of his 147 cases 74 were severe ones and 73 slight.

*Agglutination in general and its frequency.*—Of the 133 cases examined 132 gave positive agglutinations; the one negative case died within five hours and thus the test could not be repeated. About 63 per cent. of the cases agglutinated at 1/1000. A few times 1/5000 was reached and was found equally among the slight and severe cases. The lowest titre was 1/500.

*Time relationship between appearance of agglutination and onset of disease.*—In about 11 per cent. of the 123 cases in which the onset of disease was known, agglutination was positive after a few hours; in about 20 per cent. after 9 days; in the majority, about 68 per cent. after 2–4 days.

*Relationship of severity of case to agglutination titre.*—

Of 74 severe cases about 23 per cent. had a titre of	1/500.
63	1/1000.
11	1/2000.
2½	1/5000.

Of 73 slight cases about 52 per cent. had a titre of	1/500.
36	1/1000.
10	1/2000.
2½	1/5000.

*Height of titre in relationship to length of time elapsed between inoculation and onset of disease.*—

Cases with 1/500 titre after	7–88 (average = 60) days.
“ “ 1/1000 “ “	2–90 (average = 31) “
“ “ 1/2000 “ “	15–88 (average = 30–35) “
“ “ 1/5000 “ “	15 days (2 cases).

*Titre of fatal cases.*—

Of 147 cases 40 were fatal.	
52·5 per cent. had titre of	1/500.
42·5	1/1000.
2·5	1/2000.
2·5	1/5000.

*Effect of Inoculation on Agglutination.*—

Well inoculated cases (43).

About 16 per cent. had titre of	1/500.
74	1/1000.
7	1/2000.
2½	1/5000.

Badly inoculated cases (25), i.e. incomplete number of doses, long intervals between the doses, etc.

About 20 per cent. had titre of	1/500.
68	1/1000.
8	1/2000.
4	1/5000.

Uninoculated cases (49).

About 33 per cent. had titre of	1/500.
65	1/2000.

*Persistence of the V. cholerae in the intestine.*—Ninety-seven cases examined. About 13 per cent. carried the vibrio for the shortest period, viz. 10–12 days; about 79 per cent. for 13–41 days; only between 2 and 3 per cent. carried for a longer period, the longest being 48 days. A full reference is finally made to the results obtained by other workers on this question of the length of time the *V. cholerae* is passed in the stools of cholera cases.

ii. The clinical symptoms of the disease are first recounted, without contributing anything new, and then after briefly reviewing the older symptomatic cholera remedies the author gives data bearing on the efficacy of antitoxic cholera sera as evidenced by others, and finally writes of his own experience in the use of serum during the same epidemic of 1913 at Salonika.

In nearly all of his 147 cases hypertonic saline injections and cardiac stimulants, when necessary, were given. In some cases cholera serum (Kolle's and from Berne) was used as well. The author expresses his confidence in the value of a cholera serum therapy. Sixty-one severe cases treated with serum had a mortality of 55·74 per cent., while of 17 others equally severe which did not receive serum all died. The author considers promptness of treatment and large doses to be essential. He gave 40–100 cc. intravenously, sometimes two doses on the same day and generally repeated on successive days.

H. S.

NEUMANN (R. O.). *Ueber die Choleraabkämpfung im Rumanien.*  
[The Anticholera Campaign in Roumania.]—*Arch. f. Hyg.* 1915.  
Vol. 84. No. 1. pp. 1–53. With 3 sketch maps.

The author, who was in Roumania during the 1913 cholera outbreak and had facilities for travelling and observing the various combative measures employed, gives here a long and somewhat rambling account of what he saw. He worked in the laboratories of CANTACUCINO and BABES in Bukharest, which town owing to the energy and foresight of the authorities was spared the disease very largely. Cholera stools, at times as many as 1,000 per day, were examined by the following emergency method:—A loopful of a peptone water subculture from the stools (24 hours at 37°) is inoculated on to an agar slope, commencing at the bottom of the tube; in this way after six hours' incubation single colonies should have grown on the upper part of the slope and the cholera colonies be distinguishable in the first place by their aspect and in the second place by smear and agglutination tests. It is advisable to use as high-titred a serum as possible. In Bukharest they worked with one positive at 1:30,000. Large quantities of cholera vaccine were prepared here, time and trouble being saved by the use of roll-cultures in 5 litre bottles and a standardisation of the emulsion by its opacity. BABES preferred a vaccine prepared from strains selected for their want of toxicity (as evidenced by reaction after inoculation) and for the extent to which they stimulated the production of antibodies. He gave 3–4 mg. of cholera culture for the first dose and six days later 5–8 mg. CANTACUCINO preferred a multi-valent vaccine and gave three and smaller doses with intervals of 7–8 days, the total amount inoculated being the same as BABES gave.

As the outbreak came primarily from Bulgaria the chief attention was paid to the frontier line of the Danube. The cholera vibrio was found in the Danube at Nikopoli and other places. As might be expected, more cases occurred along the Danube and other rivers than elsewhere. Very large quarantine stations were established on the Danube at Cimmicea, Turnu-Magurele and Sulina, through which troops returning to their own country after peace had been declared had as well to pass. In these barracks four rows of five huts, each taking 40-50 men, were usually erected, thus giving a row each for the segregation of severe cases, slight cases, convalescents and carriers. Wire gauze windows were extensively employed to lessen the fly danger and lime was freely used on the paths and buildings, both inside and out. Infected material such as bedding, clothes and dressings, was burnt daily, the kitchen and table articles being sterilized.

Surrounded as Roumania was by countries infected and threatening with diseases like cholera, typhus, and plague it was necessary to use very general precautions as well. The entire civil and military sanitary organization came under the control of a central authority, which proceeded to limit traffic with outside countries to a certain few routes and to forbid the importation of vegetables, fruit, or fresh animal foods; all travellers were medically examined and quarantined for five days, those from Russia on account of the danger of plague for ten days. The usual examination and "disinfection" of travellers, as seen by the author in Roumania, Russia, Turkey, Greece, and Italy seemed to be of the feeblest, frequently going no further than a slight "odorising" of the travellers with a carbolic or formalin spray.

H. S.

WEISSKOPF (A.) & HERSCHMANN (H.). *Zur Epidemiologie der Cholera asiatica.*—*München. Med. Woch.* 1915. June 22. Vol. 62. No. 25. pp. 862-864.

Stationed in hospitals at Mitrovica and Sid (Slavonia), the authors had many cases of cholera under their charge. Water as a source of cholera infection could, they decided, be almost entirely excluded, its importance having been greatly exaggerated in the past. All cases were contact ones. The number of carriers was found to be high—of 247 patients at Mitrovica 56 "carried"; on the other hand, unlike in the case of typhoid, the cholera vibrio did not persist long in the intestinal tract. Of the 247 cases 191 were free of the vibrio at the end of illness, 32 carried for 14 days, 24 for 20 days, which shows that the usual five days quarantine without bacteriological examination is no reliable protection. The mortality at Mitrovica was 34 per cent., at Sid 40 per cent. and diminished as the epidemic progressed. Treatment consisted of *Bolus alba* or *Carbo animalis* internally and hypertonic saline injections. Tincture of iodine was not found to quell vomiting, nor did MOLDOVAN's cholera vaccine appear of use, but the number of cases so treated was small (24). For diagnostic purposes the type of stool offered no help; with regard to media, occasionally direct plating on to Dieudonné gave a positive result while peptone water enrichment returned a negative. Dörr's dried medium had the great advantage of being ready for use a few hours after its preparation and, while not as selective as the ordinary Dieudonné, still presented no

difficulties in the differentiation of *V. cholerae*. Suspected colonies were diagnosed by agglutination with a high titred serum. Inoculation results were as follows :—

192 cases (not inoculated)	had a mortality of 39·1 per cent.
41 „ (inoculated once)	„ „ „ 17·1 „
14 „ (inoculated twice)	„ „ „ 14·3 „

[As however inoculation was only begun after the commencement of the outbreak and the severity of the epidemic diminished with its progress, these figures naturally exaggerate the influence of the treatment.]

H. S.

WEISSKOPF (A.). Ueber eine Choleraepidemie in M. im Dezember 1914 bis Januar 1915. [A Cholera Epidemic in M. from December 1914 to January 1915.]—*Wien. Klin. Woch.* 1915. Apr. 8. Vol. 28. No. 14. pp. 385–386. With 1 chart.

On cholera appearing in M. where soldiers were quartered, immediate and energetic measures to combat it were taken; e.g. a hospital for cholera cases and suspects was established outside the town; the streets where these occurred were isolated and the inhabitants warned of the danger of intercourse with the troops; a special cholera transport service was arranged; streets and yards were liberally sprayed, almost flooded with lime; disinfectants for use on hands stood in front of all latrines and closets; to keep the men from drinking possibly contaminated water, coffee and tea were supplied freely at all times; the medical authorities visited all men twice a day and inspected general arrangements every day; the washing of hands before meals and the boiling of table ware was ordered. Prophylactic inoculation was begun on the day following the appearance of the disease and the second dose had been given to all by the 9th day.

H. S.

MADDOCK (C.). Report and Statistics of the Cholera Epidemic in the Ahmednagar District for the Years 1912 and 1913.—*Indian Med. Gaz.* 1915. Vol. 50. No. 7. pp. 255–257.

In the Admednagar district during 1912 and 1913, 443 towns and villages were affected by the cholera epidemic and among 900,000 odd inhabitants a case rate of 1·75 per cent. and a death-rate of 0·84 per cent. ensued.

Potassium permanganate pills were given according to ROGERS and to all patients but those who refused treatment; the results may thus be regarded as based on unselected cases. The statistics for the whole district were as follows :—

4,574 cases treated with potassium permanganate pills,	mortality = 35·57 per cent.
11,599 cases not so treated	.. „ = 51·64 „

Still better results are shown by the cases that came directly under the care and control of the medical officers in charge of dispensaries.

Here 423 cases treated with potassium permanganate pills,	mortality = 21·98 per cent.
60 cases not so treated	.. „ = 60·0 „

The author found the “pinking” of suspected wells with potassium permanganate of considerably efficacy in preventing the spread of the disease.

H. S:

WIENER (E.). *Zur Symptomatologie und Therapie der Cholera.* [Cholera Symptoms and Therapy.]—*Wien. Klin. Woch.* 1914. Vol. 27. No. 50. pp. 1605–1607.

An account of some less frequently described symptoms, observed in epidemics at Alexandria, El Tor, and Calcutta. The author considers them the results of toxosis and classifies them (1) as nervous: cramps in the flexor muscles of the upper arm; pains symmetrically disposed in the lower limbs (occasionally in the upper limbs as well) beginning in the toe-tips and extending along the sides to the dorsal and sometimes plantar surface of the foot; (2) as vascular: injected conjunctiva; (3) as dermic: trophic lesions of the skin of the lower limbs, from slight peeling to gangrene with loss of both feet; rashes, chiefly urticarical.

In therapy the author follows ROGERS, recommending however hydrogen peroxide 1–3 per mille to be given as a drink in place of potassium permanganate.

H. S.

ROGERS (Leonard). *The Results of the Hypertonic and Permanganate Treatment in 1000 Cases of Cholera; with Remarks on the Value of Alkalies in the Prevention of Uraemia and the Rôle of Atropine.*—*Lancet.* 1915. July 31. pp. 219–223.

In this paper the author brings up to date the mortality results obtained from his cholera wards under his largely physiological methods of treatment, viz., the combined hypertonic saline and permanganate therapy, and shows a steady decrease in the death-rate, which has now fallen to almost one-third of what it was before the author introduced his treatment in its various stages.

TABLE I.

Results of the Hypertonic and Permanganate Treatment of Cholera compared with Former Methods.

Years.	Cases.	Deaths.	Mortality.	Recoveries.
			Rectal and Subcutaneous Salines.	
			Per cent.	Per cent.
1895 to 1905 ..	1,243	783	59.0	41.0
			Normal Salines Intravenously.	
1906 ..	112	57	51.9	49.1
			Rectal and Subcutaneous Salines.	
1907 ..	158	94	59.5	40.5
			Hypertonic Salines Intravenously.	
1908 to 7–1909 ..	294	96	32.6	67.4
			Hypertonic Salines plus Permanganates.	
8–1909 to 12–1912	436	124	28.4	71.6
1913 ..	200	49	24.5	75.5
1914 ..	222	49	22.1	77.9
1915 to June ..	145	29	20.0	80.0
8–1909 to 6–1915	1,003	251	25.0	75.0

Table II. is one of age-mortality and demonstrates the great vulnerability of ages below 5 and above 40 years. Collapse at these ages is rarely treatable with success owing to the patients' lack of resisting power, but the author hopes for better results on giving slow continuous subcutaneous injections of hypertonic saline by means of a thermos flask and on giving glucose enemata as a means of supplying the patient with foodstuff.

TABLE II.  
Age Mortality under the Old and the New Treatments.

Old system 1895-1905.				New system 1913-15.			Reduction of mortality.
Age.	Cases.	Deaths.	Per cent.	Cases.	Deaths.	Per cent.	
To 5 years	36	19	52.8	22	8	36.3 } 21.7 8.33	61%
5 to 10 years				24	2		
10 , 20 "	150	80	51.3	121	17	14.0	73%
20 , 30 "	468	274	58.5	197	44	22.3	64%
30 , 40 "	273	174	63.7	134	28	20.9	67%
40 , 50 "	111	77	69.4	43	16	36.5	47%
Over 50 "	38	28	73.7	23	11	47.8	35%

TABLE III.

Analysis of the Remaining Causes of Death from Cholera from 1912 to 1915.

Collapse.		Uraemia.				Other Causes.						Total admiss-ions.	Total deaths.	Re-coveries.	Deaths		
		Day of admission.		Total cases.	Percent-age.	Cardiac failure.	Pneu-monia.	Hyper-pyrexia.	Septic, &c.	Total cases.	Percent-age.						
Year.	No.	Percentage.	First day.									Second day.	Later.				
1912..	22	12.94	15	4	5	24	14.1	1	3	2	2	8	4.7	170	54	68.23	31.7
1913..	24	12.0	11	2	4	17	8.5	2	4	2	-	8	4.0	200	49	75.5	24.5
1914..	17	7.66	11	5	9	25	11.2	2	2	-	3	7	3.15	222	49	77.9	22.1
1915..	15	10.34	2	1	2	5	3.4	2	5	-	2	9	6.2	145	29	80.0	20.0

TABLE IV.  
The Alkalinity of the Blood in Cholera.

Alkalinity.	Recovered.	Died from			Total deaths.	Total cases.	Mortality.	Percentage.
		Collapse.	Uraemia.	Other causes.				
N/35 to N/45	3	1	—	—	1	4	25%	6.4
N/45 to N/60	12	2	—	1	3	15	20%	24.2
N/60 to N/80	18	3	—	3	6	24	25%	38.7
N/80 to N/100	8	3	—	1	4	12	33%	19.4
N/100 and over	2	—	5	—	5	7	71%	11.3
								69.4



Table III. gives particulars as to the various causes of death, and under the following headings the author discusses the analysis.

*Collapse* is no longer the chief cause of death. Hypertonic injections should be persisted with and as much as 34 pints in the course of a few days have been necessary for success. The most difficult cases are those in which a relatively low specific gravity of the blood (1,057 instead of the usual 1,064 or more) indicates that an anaemic and generally poor condition of health existed before the onset of the cholera attack and that the patient will probably not possess sufficient recuperative power to pull through.

*Uraemia.* One third of the cases are the result of the suppression of urine for two or more days; these are very difficult to deal with, owing to proper treatment not having been applied in the earlier stages. The remainder are cases in which in spite of repeated injections the blood pressure cannot be kept high enough (100 mm. and over) to allow of proper renal action. The author used to consider this due to a vaso-motor paralysis but the success of the new treatment by injection of alkalis points to its being the result of an acidosis. Table IV. summarises an investigation into the alkalinity of the blood in relationship to mortality rate and especially death from uraemia. It is seen that, as had been previously suggested by SELLARDS, an acidosis exists more particularly in the severe cases.

The treatment adopted by the author in all early cases requiring a second saline injection, and straight away in cases admitted late with diminished renal secretion, was to inject "one pint containing 60 grains of sodium chloride and 160 grains (2 per cent.) of sodium carbonate, and to continue the transfusion with hypertonic saline up to the required total amount as judged by the specific gravity of the blood. The same procedure was repeated at each subsequent intravenous injection. The amounts of sodium bicarbonate injected in different cases in this manner varied from 160 grains up to 1,120 grains in those who recovered, while in no less than five successful cases 800 or more grains were injected before free secretion of urine was obtained."

The results have been very successful and are shown in Table III, the uraemia mortality of 11.1 per cent. for 1912-1914 being reduced to 3.4 per cent. for 1915. Cases of threatened post-choleraic uraemia, where although renal secretion may be re-established the patient develops boils and bed sores and dies, have shown themselves to be due to acidosis also. The author recently saved two cases with the bicarbonate treatment, a success which had previously never been attained.

*Pneumonia.* "A septicaemic manifestation of the disease occurring in very severe cases. During the last four years it has caused 1.9 per cent. of the mortality or about 1/10th of the whole."

*Cardiac failure and exhaustion* caused 1 per cent. of the mortality.

*Hyperpyrexia.* Less frequent now than before the introduction of intravenous injections.

In some 75 cases the author, following a suggestion of LAUDER BRUNTON's, tried the use of atropine in cholera cases, the reason for the suggestion being that atropine combats muscarine poisoning symptoms, which resemble those of cholera greatly.

He gave it hypodermically in doses of 1/100 gr. for adults morning and evening, alternate cases being omitted from this treatment to

serve as controls. Table V shows, as far as can be judged from the number of cases, with what success the method was attended, death from collapse being particularly guarded against.

TABLE V.  
Atropine Hypodermically in Cholera.

	Re- covered.	Died from			Total deaths.	Total cases.	Deaths. %
		Col- lapse.	Urae- mia.	Other causes.			
Atropine ..	67	3	2	3	8	75	10·7
No atropine	57	9	3	6	18	75	24·0

H. S.

WHYTE (G. Duncan). **The Treatment of Cholera by Hypertonic Saline Solutions during an Epidemic at Swatow, South China.**—*Brit. Med. Jl.* 1915. Sept. 18. pp. 425-429. With 2 charts.

A practical account of the application of ROGERS's hypertonic saline treatment in cholera. In testing the specific gravity of the patient's blood at the bedside, the author made use of mixtures of two oils, such as oil of wintergreen and castor oil, in various proportions as standards into which drops of blood were allowed to fall. A specific gravity below 1·062 requires no injection, between 1·062 and 1·066 about 80 oz. should be sufficient and over 1·066 about 120 oz. A sphygmomanometer was used for registering blood pressure, the author agreeing with ROGERS that anything below 70 mm. of mercury indicates some degree of cardiac failure and the necessity for saline injections. The diastolic pressure, as being the more important, should be estimated as well as the systolic; it is misleading to regard the difference between the two as always about 30 mm. In cases of aortic incompetence, for instance, it may be much greater, the good systolic pressure giving a false sense of security. In cases of low blood pressure in which the specific gravity of the blood remained low, vaso-constrictors were administered. The author considers that "the almost routine use of calomel in doses of  $\frac{1}{2}$  grain every hour" prevent the occurrence to any extent of nausea and vomiting.

The mortality amongst treated cases was as follows :—

60 per cent. for the 15 cases between 1 and 10 years of age.  
 23    "        "    189    "        "    10 and 60    "        "  
 63    "        "       8     "        "    over 60.

The main causes of death were collapse, hyperpyrexia and uraemia. With regard to collapse, constant attention to the patient's blood pressure is necessary; visits should be paid twice a day. To avoid hyperpyrexia as far as possible, it is necessary to use saline solution not only sterile but also not contaminated with dead organisms, which

of themselves can cause a rise in temperature. The saline must also not be too concentrated or an osmotic reflux of toxin laden fluid may take place from the intestine. In febrile patients the injections should preferably be of a temperature between 70° and 80° F. In the treatment of uraemia, it is necessary to maintain a raised blood pressure and a diminished concentration of the blood by means of saline injections and to relieve congestion of the kidneys by cupping.

H. S.

**SAVAS (C.). Die Serumbehandlung der Cholera in Griechenland.**

[The Serum Therapy of Cholera in Greece.]—*Therap. Monatshefte*. 1914. Oct. Vol. 28. No. 10. pp. 653-656.

A compilation of the opinions of a number of Greek doctors on the value of serum therapy in cholera during the epidemic which broke out in Greece during the 1913 Balkan campaign after a period of 65 years of quiescence. It was difficult to assess the real value of the remedy, seeing that it always went hand in hand with other measures of recognised efficacy. The serum was obtained from the Pasteur Institute in Paris, from Berne, Vienna and Dresden, no difference in the various samples being remarked, and was given generally intravenously, sometimes mixed with the saline injection, and in doses varying from 10-100 cc.

The opinions of the following are quoted :—

Dr. ANTONOPOULOS in Salamis and Dr. METAZAS with the soldiers of the V division [ ? number of cases ] saw no good result follow the treatment.

Dr. PRINKOS (75 cases) was strongly in favour, if the serum can be given early in the disease ; a delay of 24 hours after the onset of the symptoms may render it useless.

Dr. TSALAS gave 40 cc. intravenously and on successive days with good results.

Dr. LEFAS (29 cases) considered that when serum is combined with other remedial measures and is given intravenously, the effect is marked. In a number of his cases treated with serum given intravenously the mortality was 22·5 per cent. ; in others where the serum was administered subcutaneously the mortality was 41·3 per cent. (In the following places—Arta, Trikkeri, Salamis, Tzajesi-Stavros and Salonika—where no serum was used, the mortality varied between 40 per cent. and 60 per cent.)

In the Salonika hospital for infectious diseases large doses of cholera serum, even up to 100 cc., were much used. Fifty cc. seemed to give the best result ; the large doses (100 cc.) though producing no particularly unfavourable symptoms proved less effective. Occasionally slight anaphylaxis developed on repeating the injection. Dr. LIVIERATOS (147 bacteriologically and clinically diagnosed cases) treated 73 with serum (40-80 cc. doses ; sometimes repeated). Of these 61 were severe cases and had a mortality of 55·7 per cent. ; 12 were slight cases, none dying. The remaining 74 were treated without serum and of the 17 severe cases none survived, while none of the 57 slight cases proved fatal. He considered large doses of serum the most effective.

Savas summarises as follows: Cholera serum given intravenously sufficiently early in the disease and in combination with saline injections is apparently productive of good results in many cases.

All workers found Iodine tincture as an internal medication of no use.

H. S.

NAAMÉ. *Le traitement du choléra par l'adrénaline.*—*Presse Méd.* 1914. Dec. 10. Vol. 22. No. 79. p. 725.

The author claims striking results for an adrenaline therapy in cholera, giving 4–6 mg. per day subcutaneously for several days together with saline intravenous injections. He considers the cholera toxins to have an elective action on the suprarenal capsules and regards the disease as consisting of two forms, a more or less harmless intestinal form and a more dangerous suprarenal form, manifesting itself simply as a “toxic hypopinephritis.” The great tolerance shown by the cholera patient towards adrenaline should be accepted as a sign that an active principle, which the disease is destroying, is being restored to the organism.

H. S.

MARCOVICI (Eugen) & SCHMITT (Max). *Zur Therapie der Cholera asiatica.*—*Wien. Klin. Woch.* 1915. Aug. 19. Vol. 28. No. 33. pp. 894–896.

MARCOVICI's success in the treatment of dysenteries with allphen, a garlic-salol preparation, led to its being used in some 24 cases of cholera. Twelve 0.5 tablets were given per day after food or, if there was vomiting, after the administration of chloroform water, which in doses of 4–5 teaspoonsful per day was found effective in suppressing the vomiting. High enemata (1–1½ litres containing 20 gm. allphen per litre) were also given once or twice a day. The authors report favourably of the treatment and suggest that bactericidal, perhaps also antitoxic, disintegration products are formed in the intestine.

H. S.

DITHORN (Fritz) & LOEWENTHAL (Waldemar). *Zur Technik der Cholera- und Typhusimpfstoffherstellung in Grossen.* [The Technique of the Preparation on a Large Scale of Cholera and Typhoid Vaccine.]—*Deut. Med. Woch.* 1915. Aug. 19. Vol. 41. No. 34. pp. 1006–1008. With 3 figs.

A detailed account of the method followed by the Berlin Untersuchungsamt in the preparation of cholera vaccine. The vaccine, as is usual in Germany, was standardised by reckoning the loops per plate of culture and emulsifying so as to give 2 loops per cc. Standardisation by comparison of opacity was regarded as difficult owing to the differences in colour of emulsion that various cultures gave. Sterilisation took place in small quantities of 90 cc. In 10 minutes the emulsion had reached the temperature of the water bath (54° C.); one hour at this temperature was allowed for the killing of a cholera emulsion. If flasks containing large quantities such as 2 litres were used, the authors found that it took an hour to raise the temperature from 21°–54° and considered that this longer period in the water bath

might be detrimental. The vaccine was supplied in bottles with either rubber or glass stoppers. Owing to a shortage of rubber, bark corks were often used, being sterilised as follows:—Soaked in xylol for 24 hours; then in paraffin (melting point  $45^{\circ}\text{C}.$ ) and heated to  $200^{\circ}$ – $210^{\circ}\text{C}.$  The paraffin penetrates for 1–2 mm., renders the corks elastic and gives a good stopping and sterile surface. In order to economize in cotton wool, bottles are now sterilised without cotton-wool pluggings, the mouths of the bottles being covered by overhanging glass lids instead.

H. S.

FISCHER (Bernhard), BITTER (Ludwig) & WAGNER (Gerhard). *Vereinfachung und Verbilligung der Herstellung von Choleraimpfstoff.* [The Simplification and Cheapening of the Preparation of Cholera Vaccine.]—*München. Med. Woch.* 1915. June 8. Vol. 62. No. 23. pp. 770–773. With 2 figs.; June 15. No. 24. pp. 813–814. With 1 fig.

In an effort to simplify and cheapen the production of cholera vaccine on a large scale, the authors had recourse to tin dishes in place of test tubes, Petri dishes and Roux bottles, and to yeast agar instead of the usual nutrient agar. By this means the laboratory was easily able to cope with 80 litres of vaccine per day, whereas before adopting the change 10–20 litres were with difficulty managed. The tins had been made for the fish preserving trade, were roughly  $6 \times 4 \times 1$  inches in size and owing to their shape [see Fig. 1]

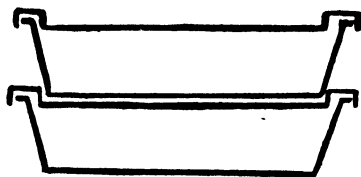


Fig. 1. Tins for Production of Cholera Vaccine.

could be packed one on top of the other, thus economising room in the sterilisers and incubators. Rusting rendered them useless after having been used six times, but they lasted for all that longer than the average Roux bottle and were more cheaply replaceable. Other advantages were the greater ease with which the emulsion could be poured from the tin dish than from an ordinary Petri dish and the constant size, so that when standardising the vaccine by the surface of growth emulsified calculations were much simplified. (The author found that the amount of a 24 hours agar culture necessary in their case to produce a vaccine containing the requisite 2 standard loops—4 mg.—of culture per cc. was 2 square centimetres).

The yeast agar was made from a preparation of yeast which was on sale as a food and had been washed, rendered non-bitter and dried. Ordinary non-bitter brandy yeast might have been equally well used, but was slightly more expensive and contained a varying amount of water. The medium consisted of yeast (3 per cent.), sodium chloride and agar autoclaved and titrated in the usual way. It gave as good results as ordinary agar and cost but one-fifth. The opacity of both dish and medium was of no importance in vaccine preparation.

A convenient apparatus is illustrated in Fig. 2 by means of which specific quantities of the finished vaccine may be supplied rapidly and with sterility. It is the lower end of a siphon or the direct outlet from the flask containing the vaccine; the additional calibrations at 55 and 22 cc. allow of 10 per cent. surplus being put into the vials, thus compensating for the amount that is lost by wastage when inoculation takes place; no doubt a cotton wool filter would be necessary at the air vent in the upper part of the apparatus.

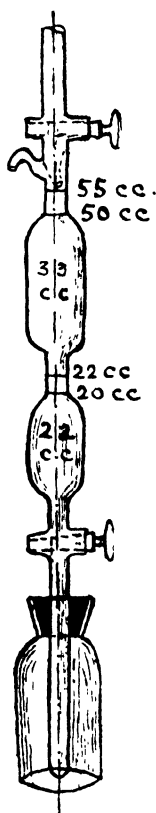


Fig. 2.  
Apparatus  
for  
Supply of  
Cholera  
Vaccine.

The question of sterilization of the vaccine is considered. The authors found the temperature chosen ( $53^{\circ}\text{C}.$ ) did not suffice to sterilize with certainty typhoid or even cholera vaccines in  $1\frac{1}{2}$  hours or paratyphoid in 24 hours. According to FORNET a raised temperature for killing causes an increased inoculation reaction and 24 hours at  $53^{\circ}\text{C}.$ , while still being uncertain as regards sterilizing the emulsion, might easily result in a considerable growth of any thermophilics present. Even after two hours at  $53^{\circ}$  the authors found that contamination by thermophilics occasionally resulted. They propose therefore the use of hydrochloric acid as disinfectant. A quarter of an hour of 0.136 per cent. HCl is very effective and the acid can then be neutralised by the addition of NaOH.

H. S.

**OTTOLENGHI (D.).** *Per la preparazione del vaccino anticolerico.*  
[The Preparation of Cholera Vaccine.]—*Polichinico.* Sez. Prat.  
1915. Aug. 8. Vol. 22. No. 32. pp. 1057–1059.

A short account with *no details* of an experimental investigation on the efficacy of cholera vaccines killed by the following methods—(1) cholera cultures autolysed at 37° and subsequently filtered; (2) killing by heating to 60° or 53° for one hour; (3) killing by ether in liquid or vapour form. All the vaccines were of the same strength and age; one inoculation, seven days previous to the investigation, was given, the experimental animal being the rabbit.

It was found (a) that no superiority could be discerned in any of the methods with regard to the formation of agglutinins and bacteriolysins, as shown by *in vitro* experiment; in every case they were abundantly produced; (b) that while the vaccine killed with ether vapour produced a serum which failed to protect guinea-pigs against a lethal dose of cholera vibrios, the other vaccines gave rise to serum with excellent protective powers; (c) that agglutinins persist to a marked degree and bacteriolysins to a somewhat less degree in animals inoculated with vaccines killed by heat or ether vapour, vaccines differently treated not giving such good results. Therefore killing by heat is not only the simplest but the best method, 53° being a better temperature than 60°. The author gave 1 cc. doses, beginning with 500 or 1,000 million for the first and reaching 2,000 million for the third. There was no marked local or general reaction.

H. S.

**SOLTMANN (Heinz).** *Die Prüfung der zur Schutzimpfung gegen Cholera hergestellten Impfstoffe.* [The Testing of Cholera Vaccines.]—*Zeitschr. f. Hyg. u. Infektionskr.* 1915. Aug. 18. Vol. 80. No. 2. pp. 323–344.

In the main a consideration of the best method of standardizing cholera vaccines. Some in Germany prepare cholera vaccines by reckoning the loops per surface area, 10 loops going to a slope, 66 to a certain sized Petri dish and so on; others weigh the growth, carefully removed from the agar surface, reckoning 2 mg. to 1 loopful, which is the unit of dosage. This latter more laborious way was not found to be more exact than the simpler first-mentioned one. In reviewing the accuracy of these two methods the author made use of the Thoma-Zeiss counting cell for enumeration purposes. This direct counting was more exact, though not so convenient as the comparison of opacity with a standard emulsion, and very much more exact than either WRIGHT's blood corpuscle method or the plating out method.

H. S.

**REMBOLD.** *Ueber den Keimgehalt von Cholera- und Typhusimpfstoffen.*  
[The Bacterial Contents of Cholera and Typhoid Vaccines.]—*München. Med. Woch.* 1915. July 27. Vol. 62. No. 30. pp. 1005–1006.

While examining some cholera vaccines with abnormal inoculation reactions the author discovered a great divergence in opacity in the various samples, the extremes being as 1:7. He attributed this

chiefly to the German method of standardising vaccines by the number of loops of culture per cc. The method depends on the false assumption that in equal times on equal agar surfaces equal numbers of cholera vibrios will grow. The author suggests an opacity standardization as a rapid and more reliable method, using as standard a counted cholera emulsion or, better still, a suspension of some white inorganic powder which will keep indefinitely.

H. S.

ARONSON (Hans). **Eine neue Methode der bakteriologischen Cholera-diagnose.** [A New Method for the Bacteriological Diagnosis of Cholera.]—*Deut. Med. Woch.* 1915. Aug. 26. Vol. 41. No. 35. pp. 1027–1029; Sept. 9. No. 37. p. 1088.

This method which, the author declares, reduces the bacteriological diagnosis of cholera to the simplest of tasks, is based on a combination of the selective value for *V. cholerae* of an alkaline reaction in the culture medium, and the efficiency as indicator of the fuchsin-sodium sulphite compound, as present in Endo's medium, when sugar, in this case cane sugar and dextrin, is split by the action of the cholera vibrios.

One hundred cc. of hot liquid 3·5 per cent. agar, prepared as usual with Witte peptone and meat extract and in a 200–250 cc. flask, is treated as follows:—6 cc. of 10 per cent. Sod. Carb. sicc. is added. It is then steamed at 100° for 10–15 minutes. While still hot are added:—

5 cc. of 20 per cent. cane sugar.

5 cc. of 20 per cent. dextrin.

0·4 cc. of saturated alcoholic fuchsin solution.

2 cc. of 10 per cent. sodium sulphite.

The precipitate settles rapidly and from the supernatant fluid plates are poured, which after drying  $\frac{1}{2}$  hour at 50° C. in an inverted position are ready for use and may be kept for a few days by storing in the dark.

On this medium *V. cholerae* develops well in 10 hours, but it is not till after 15–20 hours, when the colonies are considerably larger, that they acquire the ultimate strong red colour. Organisms of the coli group are more or less totally inhibited. The various additions to the nutrient agar may be kept ready made up, all but the sod. sulphite being indefinitely durable.

The author was only able to test his medium in one case of cholera, the result being as strikingly good as in the laboratory experiments.

He found it possible to put up the various ingredients, dry, mixed and as tablets, thus requiring only their solution in ordinary nutrient agar for the preparation of his selective medium, a simplification very desirable in a field laboratory.

H. S.

JACOBITZ. **Cholerauntersuchungen.** [Cholera Diagnosis.]—*Cent. f. Bakt.* 1. Abt. Orig. 1915. May 20. Vol. 76. No. 2/3. pp. 97–108.

An account of 395 examinations carried out in Beuthen, Upper Silesia, between November 5th, 1914 and January 31st, 1915. After



the first few cases, which appeared to originate without relationship to one another, and as the later ones multiplied, a simplified plan of examination was devised.

I. From the original material sent in were prepared :—

- (a) a peptone water culture (Examination after 6, 12, 18, 24 hours).
- (b) 2–3 alkaline agar plates } Examination after 12, 18,
- (c) a blood alkali plate } 24 hours.

II. From the peptone water culture is prepared after 6 or 12 hours :—

- (a) 2–3 alkaline agar plates } Examination after 12, 18,
- (b) a blood alkali plate } 24 hours.
- (c) if necessary a second peptone water culture.

III. Agglutination test with a high titred serum.

Pfeiffer's test was not considered necessary for the later cases. Often enough the plates prepared from the original material gave such well grown cholera colonies that the agglutination test could be immediately carried out. Only rarely had one to wait 24 hours before seeing motile rods in the peptone water culture, which was the indication for plating out, and very rarely indeed were the motile rods so few in numbers that it was necessary to inoculate a second peptone water from the first. Generally attention was paid to the possibility of the case being one of typhoid or dysentery, and not cholera at all, by plating from the original material on to litmus-lactose and Loeffler's green agar.

Blood cultures were made from five cholera patients and seven post-mortem cases. The blood was inoculated with or without an equal quantity of bile in peptone water at 37° and examined repeatedly after from six hours up to 10 days. In none of the bloods taken from living patients was *V. cholerae* found. In two of the seven post-mortem cases the result was positive.

H. S.

BAERTHLEIN (Karl) & GILDEMEISTER (E.). *Ueber Choleraelektiv-nährböden*. [Selective Cholera Media.]—*Cent.f. Bakt.* 1 Abt. Orig. 1915. Aug. 25. Vol. 76. No. 7. pp. 550–607.

Taking into account HAENDEL and BAERTHLEIN's investigation into the relative merits of various cholera media published in 1912 [this *Bulletin*, Vol. 1, p. 208], the authors chose DIEUDONNÉ's and PILON's media for renewed examination, comparing them with the more recent ones of KABESHIMA and of HOFER and HOVORKA. (The Pilon modification of Dieudonné by substituting sod. carb. for caustic potash and by the use of defibrinated pig's blood approaches Dieudonné in selective power and surpasses it in being immediately ready for use). KABESHIMA used like PILON sod. carb. in place of caustic potash, but replaced the blood by an easily soluble haemoglobin preparation. HOFER and HOVORKA's modification consists essentially in the addition of crystal violet. The comparative tests were carried out with (a) freshly isolated cholera strains, (b) strains of cholera-like vibrios, *Alcaligenes*, *Proteus* and *Pyocyanus*, (c) cholera and cholera-carrier stools, (d) *V. cholerae* free stools from typhoid and dysentery cases and from *V. cholerae* free cholera convalescents and carriers. In this

way some 241 samples were tested on the four media and after finally investigating with over 200 samples and on similar lines a new modification of Kabeshima devised by themselves, the authors sum up as follows:—

1. Pure cultures of *V. cholerae* grew in 16–18 hours on Kabeshima excellently, on Dieudonné and Pilon well, on Hofer-Hovorka hardly at all.

2. Pure cultures of cholera-like vibrios grew on Dieudonné, Pilon, and Kabeshima but not as well as the true Koch bacillus; on Hofer-Hovorka growth rarely occurred.

Alcaligenes in pure culture generally grew on Dieudonné and Pilon well, on Kabeshima less often and then but poorly, on Hofer-Hovorka not at all.

Pure cultures of *Pyocyanus* and *Proteus* grew, the former constantly but poorly, the latter rarely, on Dieudonné, Pilon, and Kabeshima; neither developed on Hofer-Hovorka.

3. Cholera and cholera-carrier stools gave always a positive result on Dieudonné and Kabeshima, while on Pilon there were occasionally, and on Hofer and Hovorka generally, negative results.

4. Using cholera and cholera-carrier stools the *V. cholerae* was obtained in pure culture from the plates on Kabeshima in 54·7 per cent., on Dieudonné in 55·6 per cent., on Pilon in 57·5 per cent. of the cases. Neglecting the occurrence of small coccal colonies the following types were found also growing on the plates—*Alcaligenes* on Dieudonné in 25·7 per cent., on Pilon in 26·6 per cent., but on Kabeshima in only 4·75 per cent. of the cases. Occasional colonies of *Proteus*, *Pyocyanus* and *Dysenteriae* were met with on the same media. On Hofer and Hovorka all three accompanying bacteria were suppressed.

5. Using typhoid and dysentery stools the plates were either sterile or showed small coccal colonies with Dieudonné and Pilon in 82 per cent., with Kabeshima in 90 per cent. of the cases. *Alcaligenes* was found on Dieudonné in 15 per cent., on Pilon in 13 per cent., on Kabeshima in 6 per cent. Other bacteria were almost or entirely suppressed. On Hofer and Hovorka beyond cocci in four cases nothing grew at all.

6. Dieudonné is thus to be regarded as satisfactory, its drawbacks being that it is not immediately ready for use and that *Alcaligenes* grows somewhat too freely on it.

Pilon equals Dieudonné in being suitable for the growth of *V. cholerae* and in its selective power, but occasionally fails.

Kabeshima is particularly good. In most things equal to Dieudonné, it surpasses that medium in being immediately ready for use, made of easily obtained ingredients (haemoglobin), easily prepared and a good inhibitor of *Alcaligenes*.

Hofer and Hovorka proves unsatisfactory.

7. Kabeshima however possesses the drawbacks of not being durable owing to the impossibility of sterilising the haemoglobin extract, and of not having a constant alkalinity owing to the instability of the crystalline carbonate of soda. The authors obviate these difficulties by adding the smallest necessary amount of caustic soda to the haemoglobin extract before sterilising, adding then the complementary amount of sodium carbonate in the form of a 5·5 per cent. solution of a waterfree sample of the salt.

8. This modification of Kabeshima's medium is ready for immediate use, will keep about two weeks and favours the growth of *V. cholerae* to the same degree as the original Kabeshima. *Alcaligenes* is apt to grow somewhat more freely; in this it approaches Dieudonné.

9. This medium is prepared as follows:—

3½ gm. haemoglobin extract are dissolved in 10 cc. physiological saline, 10 cc. of a 5·5 per cent. solution of water free sod. carb. and 2 cc. caustic potash are added and the mixture is sterilised in steam for ¼ hour. On cooling to below 50° C. 80 cc. of a 3 per cent. agar, neutral to litmus and at 80–90° C., are added; after mixing plates are poured and, the condensation water having been evaporated in the incubator, are ready for use, any precipitate that may form being of no account.

H. S.

OTTO (R.). **Ueber die Durchführung von Massenuntersuchungen auf Cholerakeimträger.** [The Examination of Suspected Cholera Stools on a Large Scale.]—*Cent. f. Bakt.* 1. Abt. Orig. 1915. July. Vol. 76. No. 5. pp. 392–400. With 6 figs.

A description of the method worked out by the Institut für Infektionskrankheiten, Berlin, for the examination of thousands of suspected cholera stools per day. A list of the personnel, materials and apparatus needed to undertake 10,000 stools daily is given, the number of people employed being calculated at 35 (only three necessarily doctors with bacteriological experience and six trained laboratory attendants) against at least 85, if the labour-saving devices here advocated are employed. The actual method of diagnosis is the usual one of enriching in peptone water for 16–20 hours, and plating on to Dieudonné with an agglutination test of suspected colonies appearing on the plates the following day, a return being thus usually possible within 48 hours.

The primary labour-saving device is the use of special boxes for the transport of the stool specimens, fitted with racks that can be lifted out of these boxes and contain the specimens in small test tube-like vessels each corked and containing a small metal spoon, which according to instructions given holds the amount of stool needed for examination. The enrichment process is carried out in these same glass vessels by running into each 10 cc. of peptone water from a large burette-like receptacle.

With the very large number of such racks as will be needed, naturally ordinary incubators are useless and the author recommends heating an ordinary laboratory room, whose doors and windows close tightly, with one or more gas ovens fitted with automatic regulators.

Agglutinations are carried out in drops arranged in double rows on glass slides, one row being of specific serum and the other of normal serum ten times less dilute than the specific serum employed. A platinum needle holding a small amount of suspected colony is stirred first in its drop of normal serum and then passes direct to its drop of specific serum.

The various phases of the stool examination are conducted in the main by workers working in twos, one more or less trained, the other more or less untrained.

H. S.

ESCH (P.). **Fleischnatronagar als Choleraelektivnährboden.** [Alkaline Meatagar for the Selective Growth of *V. cholerae*.—*München. Med. Woch.* 1915. June 8. Vol. 62. No. 23. p. 790.]

To prepare the medium the author uses beef or fish and heats 500 gm. with 250 cc. normal soda in an aluminium pot. When dissolved it is filtered through cambric and sterilised. This medium is mixed, as needed, with neutral agar 3:7; plates should be thinly poured or somewhat less than 30 per cent. of the medium be added to the agar, otherwise cholera vibrios as well as the dysentery, typhoid and coli groups may be inhibited. After drying for one hour at 60° and standing open for 24 hours the plates are ready for use. Like Dieudonné's and other cholera agars this medium can be supplied in dried form, in which case plates can be used immediately after pouring, but as the selective power of the medium has been somewhat lowered by the drying process 36 per cent. should be added to the agar. The author considers better results are obtained than by other methods and specifies that transparency of the medium helps in the search for and recognition of cholera colonies.

H. S.

VON LINGELSHEIM (W.). **Zur Frage der Verwendbarkeit alkalischer Blutnährböden für die practische Choleradiagnose.** [The Use of Alkaline Bloodagar for the Diagnosis of Cholera.]-*Cent. f. Bakt.* 1. Abt. Orig. 1915. May 20. Vol. 76. No. 2/3. pp. 108-110.]

The author found PILON's modification of Dieudonné's medium to be almost as inhibitory as the original, when freshly prepared; only after letting the mixture of blood and sodium carbonate stand at room temperature for 1-2 days or at 37° for 12-14 hours, before adding it to the agar, could a good result be obtained with the medium. The author also found that, after standing thus, sterilization by heat was possible for the blood-carbonate mixture, and that when sterilized the mixture would keep indefinitely. The media prepared with haemoglobin in place of blood (Esch's and Kabeshima's) encourage the growth of *V. cholerae*, but are not as inhibitory for other organisms as Dieudonné's medium and Pilon's.

H. S.

LANGE (Carl). **Ein neuer Nährboden für die Choleradiagnose.** [A New Medium for the Diagnosis of Cholera.]-*Deut. Med. Woch.* 1915. Sept. 16. Vol. 41. No. 38. pp. 1119-1120.]

The principle on which this medium is based is that there are very few faecal bacteria, normal or pathological, other than *V. cholerae*, which in a highly alkaline medium can attack starch, producing on alkaline starch agar colonies surrounded by large transparent areas.

A 5 per cent. starch solution is prepared and autoclaved. One part of this is added to six parts of an alkaline agar containing 40 cc. of 10 per cent. sod. carb. to 1000 cc. of nutrient agar. After 14 hours the transparent areas begin to appear. Other faecal organisms which produce the same, can be differentiated by a practised eye apart from the ultimate agglutination test.

The advantages claimed by the author for his medium over Dieudonné's are :—The greater distinctness with which cholera colonies stand out, the better agglutinability possessed by these colonies, and the more rapid growth that occurs.

H. S.

SCHOEHL (Otto). **Practical Experience with some Enriching Media recommended for Bacteriological Diagnosis of Asiatic Cholera.**—*Philippine Jl. Sci.* Sect. B. Trop. Med. 1915. Mar. Vol. 10. No. 2. pp. 127–144.

After presenting the protocols of his work in sixteen tables, the author summarises his results, pointing out that for practical purposes the bacteria likely to grow in enriching media can be divided into three groups :—

(1). Bacteria which prefer an acid medium ; these are the lactose fermenters, i.e. the coli group ; they are present to a marked degree but can be sufficiently suppressed by the use of an alkaline enriching medium ; they do not grow on Dieudonné's agar.

(2). Bacteria which prefer a strongly alkaline medium, viz., cocci ; few in numbers and of little importance.

(3). Bacteria which stand much in the same relationship to alkalinity of medium as *V. cholerae* does and are manifestly eager competitors with it.

Peptone water of varied reaction was tested and that with a -1 reaction found to give the best results.

Ottolenghi's bile medium, dry bile in place of fresh being used however, gave bad results and failed three times out of five to grow the vibrio. Kraus's medium, a liquid variant of the Dieudonné agar, was very good and may be regarded as considerably superior to peptone water. The author suggests that a combination of peptone water and a selective enriching medium might give still better results.

H. S.

VIOLE (H.) & CRENDIROPOULO. **Note sur le Choléra expérimental.**—*C. R. Soc. Biol.* 1915. June 25. Vol. 78. No. 11. pp. 331–332.

Experimenting on rabbits the authors find that only when a loop of small intestine is ligatured at both ends does inoculation of cholera vibrios into that portion of the bowel give rise to typical cholera lesions and a multiplication of the vibrios injected ; the shorter the piece of intestine thus tied off, the higher its situation and the greater the virulence of the organism used, the more severe will these lesions be. Cholera vibrios injected even in enormous numbers into the untied intestine or indeed into the intestine after ligature at one place only, disappear within 24 hours. Cholera vibrios injected intravenously pass through the bowel wall, causing however lesions not typical of cholera. If in an animal thus intravenously inoculated a loop of small intestine has been tied off, the lesions are no more characteristic nor the numbers of vibrios greater in the ligatured portion than elsewhere.

H. S.



Days after last Inoculation.	Cholera Agglutination.				Typhoid Agglutination.			
	Titre.	Rabbits.			Titre.	Rabbits.		
		I. Cholera.	III. Mixed.	IV. Mixed.		II. Typhoid.	III. Mixed.	IV. Mixed.
7	1: 3500	+++	++	++	1: 3500	+++	+++	+++
	1: 3800	+++	++	++	1: 4000	+++	+++	++
	1: 4000	+++	++	++	1: 5000	+++	+++	++
	1: 4500	+	+	+	1: 6000	+++	+++	+
	1: 700	+	+	+	1: 7000	+++	++	0
14	"	"	"	"	1: 7500	+++	+	0
	"	"	"	"	1: 12000	++	+	0
	"	"	"	"	1: 13000	+	+	0
	1: 4000	+	+	+	1: 5000	+++	+++	+
	1: 9500	+	+	+	1: 9500	+++	++	+
21	"	"	"	"	1: 10000	++	+	†
	"	"	"	"	1: 12000	†	0	0
	1: 500	+++	++	++	1: 3000	+++	++	+
	1: 4000	++	++	++	1: 4000	+	+	+
	1: 5000	+	+	+	1: 5000	+	†	†
38	1: 10000	+	+	+	1: 6000	0	0	0
	1: 250	++	++	++	1: 2500	+++	+	+
	1: 1500	+	++	++	1: 3000	++	+	+
	1: 2000	+	++	++	1: 9500	+	0	0
	1: 7000	†	+	+				
49	1: 100	+	+	+	1: 500	+++	+	†
	1: 300	+	+	+	1: 1000	++	0	0
	1: 400	0	0	0	1: 2000	0	0	0





DANILA (P.). **Sur la vaccination avec du vaccin mixte: typhique + cholérique.**—*C. R. Soc. Biol.* 1915. Aug. 6. Vol. 78. No. 14. pp. 479-481.

To test the soundness of the plea for a simultaneous inoculation of typhoid and cholera vaccines rabbits were inoculated—I. with .5 cc. cholera vaccine, II. with .5 cc. typhoid vaccine, III. and IV. each with .5 cc. of both typhoid and cholera vaccine. The doses were twice repeated at weekly intervals and the serum tested for agglutination as shown in the table.

To decide if the failure of rabbits III. and IV. to attain or to retain a typhoid agglutination titre as well as Rabbit II. is not merely due to a difference in individual response of different rabbits, the author is repeating the experiment. The results are not to hand yet. However, as it has been thought that immunity does not run parallel with agglutinating power, the author concludes that the only proof of the efficacy of a simultaneous inoculation will be obtained in the practice of it.

H. S.

FERMI (C.) & CANO (U.). **Sulla Disinfezione dell' Intestino in generale in relazione all' infezione colerica.** [The Disinfection of the Intestine generally and with Regard to Cholera.]—*Policlinico. Sez. Prat.* 1914. Nov. 1. Vol. 21. No. 44. pp. 1537-1540; and *Ann. d'Igiene Sperimentale.* 1915. Vol. 25. (N. Ser.) No. 3. pp. 241-246.

Trying to obtain complete sterilisation of the post-mortem gut, or at any rate to get rid of cholera vibrios inoculated into it, the authors made the following experiments. Pieces of intestine about 10 cm. long were tied at one end and suspended in a moist chamber at 37°; for purposes of complete sterilisation they were then filled with various disinfectants, such as *corrosive sublimate*, *tincture of iodine*, *lysol*, *formaline*, etc., and the contents examined after 1-4 days for sterility; in no case however was it obtainable with a solution that could possibly be used *intra vitam*.

To test their second point, similar pieces of intestine were inoculated with  $\frac{1}{2}$  cc. of cholera broth culture, examined for the presence of the organism after five hours, filled with various antiseptics and then re-examined after another five and ten hours' incubation. With the following solutions, *methylene blue*, *crystal violet*, *trypan red*, *trypan blue* (all 1 per cent.), *Giemsa*, *malachite green* 1 per cent. + *eosine* 1 per cent., *resoline* 1-2 per cent., the vibrios had disappeared after five hours; with *potassium permanganate*, *eosine*, *acid fuchsine*, *basic fuchsine* (all 1 per cent.) not until ten hours had elapsed. [It is not clear if the pieces of intestine were used faecal contents and all, and it was apparently not tested if the cholera vibrios had been eliminated from the intestinal wall itself.] The authors intend examining the effect of these disinfectants when used on the living intestine.

H. S.

GILDEMEISTER (E.) & BAERTHLEIN (Karl). **Beitrag zur Cholerafrage [Asiatic Cholera.]**—*München. Med. Woch.* 1915. May 25. Vol. 62 No. 21. pp. 705-708.

Seventy stools were examined for the longevity of the cholera vibrio in them under the following conditions: the samples of stool were (C214)

small, generally 10–15 cc. and placed in Petri dishes close to the window (but protected from direct sunlight) of a laboratory which had a temperature of 12°–21° C. (average=18°), the examination taking place in the months December–March with the result given in the table.

Days the V. cholerae remained alive.	Number of stools.	Days the V. cholerae remained alive.	Number of stools.	Days the V. cholerae remained alive.	Number of stools.
1	18	13	3	25	1
2	2	14	—	26	2
3	3	15	2	27	2
4	2	16	2	28	1
5	1	17	3	29	1
6	1	18	1	30	—
7	1	19	1	31	1
8	2	20	4	34	1
9	3	21	—	36	1
10	2	22	3	37	1
11	2	23	—	51	1
12	1	24	1		

Among those which could retain live vibrios, on occasion, for weeks were the stools of carriers. The authors recognised that under natural conditions, such as on the surface of the ground in a wood or meadow, the longevity may be greater. For isolation purposes they used with good results a haemoglobin extract-alkali-soda agar similar to Kabeshima's, which was *ready for use as soon as sterilised*. This substitute for Dieudonné's medium was prepared as follows:—3½ g. haemoglobin-extract are dissolved in 10 cc. physiological saline; 10 cc. of 5.55 per cent. solution of water free soda and 2 cc. caustic potash [½ strength] is added and the whole sterilised for ½ hour in the steamer. When cooled to below 50° C. 80 cc. of a 3 per cent. agar, neutral to litmus, are added and plates poured. After a short drying in the incubator the plates are ready for use.

H. S.

- i. MUNSON (E. L.). **Cholera Carriers in Relation to Cholera Control.**—*Philippine Jl. Sci.* Sect. B. Trop. Med. 1915. Jan. Vol. 10. No. 1. pp. 1–9.
- ii. SCHOEHL (Otto) **Observations concerning Cholera Carriers.**—*Ibid.* pp. 11–17.

i. In the Manila 1914 cholera epidemic it was realized that the recognition and isolation of cholera carriers were very valuable and necessary combative measures. A search for carriers through the whole population being impracticable, direct contacts, persons in the neighbourhood of a number of cases and those employed in the handling of food and drink on a large scale, such as in restaurants and factories, were chosen for examination. During July–October roughly 30,000 of such persons were examined and 1.75 per cent. found to be carriers; in some districts the percentage was as high as 2.4 and in Bilibid prison

no less than 5 per cent. Some developed the disease after "carrying" for as long as 17 or 18 days, one of these cases dying within 8 hours of the onset of illness. Some idea of the length of time carriers harbour the vibrio is given by the detention returns of San Lazaro hospital. In July the average period of detention was 7-8 days, in August 7 days and in September 10-11; though it must be remembered that intermittent carriers may have been released before the vibrio had really and permanently disappeared. No good results were obtained by treating carriers. During treatment with 0.6 gram doses, twice daily, of salol as intestinal antiseptic, four cases of cholera supervening in carriers occurred, one of them being fatal.

ii. The author, whose observations were made in Manila during the 1913-1914 outbreak, gives the following figures as to length of time vibrios were found in the stools of cholera patients and carriers:—

For from 2-7 days in 43 cases.

„	7-14	„	„	22	„
„	14-21	„	„	6	„
„	21-28	„	„	5	„
For	48	„	„	1	„

The author agrees with GREIG that it is the gall bladder and duct which harbour the vibrio; he found an infected gall bladder in 17 and a pathological gall bladder in 3 of the 39 he examined. In five embryos of mothers dying of cholera no cholera vibrios were found anywhere, except in the waters of one in which the sac was found perforated. In 41 examinations of 27 patients and convalescents with *V. cholerae* in their stools no case of vibriuria was detected.

H. S.

GREIG (F. D. W.). **Note on a Cholera "Carrier" in Relation to the Water Supply of Calcutta.**—*Indian Jl. Med. Research.* 1915. Apr. Vol. 2. No. 4. pp. 926-933.

Since December 5th 1914 a daily examination (in place of a weekly one) of the water supply of Calcutta has been instituted. The water comes from the Hooghly and passes through settling tanks, filter beds and collecting wells to the Tallah reservoir. Here from this reservoir of filtered water which supplies Calcutta directly, on three occasions vibrio infected samples were obtained, on December 21st, December 23rd 1914 and January 10th 1915. The author isolated the true cholera vibrio and a cholera-like strain and, seeing that cholera was not particularly prevalent at the time and that the contamination was found only at this one link in the chain of the water supply, he looked for the source of the contamination in some person working at the reservoir and a cholera carrier at the same time. He found this person in a Hindu employee who collected the samples from the reservoir for examination. The stools of this man were examined on six occasions; on three no vibrios at all were isolated; on two a cholera-like vibrio; at length 15 days after the first examination the true cholera vibrio was detected. On one occasion a cholera-like strain was cultivated from the man's hands. The man gave a history of cholera when five years old (37 years previously) and of having been inoculated by HAFKINE against cholera (living vaccine) at the age of

about 20 and of having been ill for three days subsequently. The water samples in question were taken by lowering a bottle (not touched by the worker's hands) into the reservoir; probably contamination took place during the subsequent plugging of the bottle. H. S.

**STEIN. Cholerabazillenträger und ihre epidemiologische Bedeutung** [Cholera Carriers and their Importance Epidemiologically.]—*Wien. Klin. Woch.* 1915. July 8. Vol. 28, No. 27. pp. 737-739.

In the course of a lecture containing little that is new, the author declares that a subsequent "carrying" of cholera vibrios by his patients [no numbers given] who had had cholera badly, was prevented by his method of treatment, viz., a single dose of anticholera serum combined with a hypertonic saline injection, given simultaneously and intravenously. An interesting case of cholera is mentioned in which, although examined on 20 occasions, no cholera vibrios were ever detected. The gall bladder was swollen and tender and it is suggested that an infection of that organ only had occurred. H. S.

**OLSSON P. G.). Zur Variation des Choleravirus.** [The Variability of the Cholera Organism.]—*Cent. f. Bakt.* 1. Abt. Orig. 1915. May 14. Vol. 76. No. 1. pp. 23-37.

For an explanation of the facts that cholera epidemics usually commence in autumn or late summer and that water-borne infection may be much more severe than contact infection, the author devoted himself to the study of the variability of *V. cholerae*.

From months-old dung cultures of *V. cholerae* growing at room temperature the author was able to obtain, on agar plates at 37° for 20 hours and then at room temperature for 8 days, a certain number of abnormal colonies. These were conspicuous by their wrinkled surface, irregular edge, brownish colour, opacity and adhesive character, emulsification taking place with difficulty. The bacteria from such colonies were no longer motile, formed barely any skin on the surface of broth, but liquefied gelatine, gave the cholera red reaction and had the characteristic cholera smell. This altered strain retained its new character after repeated subculture on agar and after passage through guinea-pigs.

The cattle dung was used after the addition of an equal quantity of water and sterilization at 120° for  $\frac{1}{2}$  hour. It was of neutral reaction. By varying the conditions of experiment it was ascertained that length of growth on dung, an optimum temperature of from 18-20° for the subculture from the dung on to agar, with dryness of the agar surface, shallowness of the agar plate and a thick sowing, favour the development of these wrinkled colonies, but that after a sufficiently long period in the dung the abnormal colonies are obtained at high temperatures and on moist, deep plates as well. Not only by long continued growth in the dung is variation in the cholera organism induced; in broth to a somewhat less degree and in algal pond mud also though only to a slight extent, after two months at temperatures between 25° and 16°, the optimum being 18°-20°, similar wrinkled colonies appear on subculturing on to agar; old gelatine cultures on the other hand never exhibit this tendency.

OLSSON'S TABLE SHOWING CYCLIC DEVELOPMENT.

Cyclic development of the Cholera bacterium in seven stages.						
Stages.	1	2	3	4	5	6
Method.	Departure from normal bacterium.	After growing in dung 2-6 weeks.	After growth in the same dung for 4-6 further weeks.	After further growth of several weeks in fresh dung.	After daily sub-culturing on to fresh agar.	After growth on agar 1 day at 37° then 3-5 weeks at room temperature.
Colony on agar plate.	Typical.	Typical.	At 37° typical at room temperature wrinkled.	Wrinkled at rising temperatures, eventually at 37°.	Typical at sinking temperatures, eventually typical even at 14° and on dry agar surface.	Typical.
Bacterium on agar.	Normal.	Large and non-motile.	At room temperature short and non-motile.	Same as 3.	Same as 3.	At first same as 3, eventually coccal forms.
Virulence for guinea-pig of 200 g.	Minimum lethal dose = 2-3 loops.		Lower than 1.		Somewhat higher than 3.	Minimum lethal dose = 4 loop.
						7 = 1 with raised virulence.
						Growth of the coccal forms on agar for 20 hours at 37°.
						Normal, motile.

Twelve other cholera strains were tested on dung and in every case, with the exception of the strain El Tor, the same variation resulted. In El Tor the only change brought about was that colonies grew somewhat irregularly and vine-leaf-like and that after as long a stay as nine months in dung.

To induce in this altered bacterium a return to its usual condition the author started with a culture growing wrinkled at 40°, subcultured daily on to a fresh agar slope, plating out on agar at the same time to search for unwrinkled colonies. On the sixth day a few unwrinkled colonies appeared and from one of these subcultures were made as follows: from an agar slope at 40° was sown an agar plate at 37°, followed by a slope at 40° from a 37° plate colony until unwrinkled colonies grew at 37°. Having thus obtained a culture growing unwrinkled at 37°, by the same method unwrinkled growth at lower temperatures was induced. On thus finally converting a wrinkled growth into one unwrinkled at all temperatures, the author found that the culture *had gained in virulence*, as compared both with the unwrinkled culture he had begun with and the wrinkled variant he had produced from it. In three of the eleven other cholera strains which were converted from the unwrinkled to the wrinkled form, reconversion to the original type with rise in virulence was accomplished.

The cyclic development produced by the author is shown in the table on page 505, it being seen that in the dung the bacteria become gradually longer and non-motile, that grown on agar again and at low temperatures in the wrinkled colonies short and non-motile forms prevail, that by further cultivation on agar normal colonies reappear with at last normal motile vibrios. The virulence is then greater than at other stages of the cycle.

Although the altered character of the cholera vibrio remained unchanged after months of subculturing and survived many passages through animals, the author prefers to call the variant, with ALMQUIST, an example of "relative heredity," reserving the designation "mutation" for such processes as give variants which remain constant for years under all conditions, and he considers that no sure proof of mutation in this strict sense occurring in the bacterial world has been established.

H. S.

MAZZETTI (Loreto). *Modificazione del potere di riduzione del Vibrioni colerico*. [The Variability in the Reducing Power of *V. cholerae*.] —*Riforma Med.* 1915. June 26. Vol. 31. No. 36. pp. 709-712.

According to EMMERICH the nitrous acid produced in the human intestine by *V. cholerae*, from the nitrate introduced with the food, damages the vibrios to such an extent that an epidemic would not be possible, did not these altered vibrios acquire again and in exalted measure during a sojourn in the soil under certain circumstances the power of reducing nitrates to nitrites and thus increase their toxicity. The author carried out experiments to prove the possibility of an alteration in the reducing capabilities of *V. cholerae* under conditions suggested by EMMERICH's theory and considers that, although the figures he obtained owing to his not having used soil according to

EMMERICH's prescription were not as conclusive as those given by that worker, they nevertheless support his views. The author employed a vibrio isolated two years previously and cultivated since then on artificial media. The following table allows of a comparison of the different amounts produced by the organism at the two stages in its existence.

TABLE I.

	Nitrous acid produced per 100 cc. peptone water containing 1 per cent. sodium nitrate after days of incubation.				
	1	4	5	8	10
Vibrio cholerae recently isolated from a cholera case .. ..	gr. 0.048	gr. 0.20	gr. 0.22	gr. 0.285	gr. 0.30
Same strain after two years of saprophytic existence .. ..	gr. 0.1	gr. 0.13	gr. 0.187	gr. 0.238	gr. 0.262

Using garden soil and an apparatus by means of which a tubeful of the dry, sterilized earth after inoculation on the surface with a few drops of cholera culture could be gradually moistened by capillary attraction from below with peptone water containing 1 per cent. sodium nitrate, the author by removing from time to time samples of the surface earth looked for an alteration in the reducing power of the vibrio, with the result, shown by a comparison of Tables I. and II., that although a slight increase is occasioned the amount of nitrous acid produced does not equal that obtained when the culture was a recently isolated one.

TABLE II.

V. cholerae taken from the soil after days.	Nitrous acid produced per 100 cc. peptone water containing 1 per cent. sodium nitrate after days of incubation.			
	5	10	15	20
4	gr. 0.154	gr. 0.280	gr. 0.280	gr. 0.280
8	gr. 0.171	gr. 0.270	gr. 0.270	gr. 0.270
12	gr. 0.143	gr. 0.171	gr. 0.171	gr. 0.230
16	gr. 0.211	gr. 0.200	gr. 0.230	gr. 0.270
20	gr. 0.171	gr. 0.200	gr. 0.250	gr. 0.250

Tables III. and IV. give the result of experiments to establish the effect of drying and of exposing to the sun *V. cholerae* both in agar slope cultures and inoculated into soil spread 1 cm. deep in Petri dishes, samples being subsequently inoculated into peptone water + 1 per cent. sodium nitrate to test the nitrous acid producing qualities.

TABLE III.

Agar culture.	Nitrous acid produced per 100 cc. peptone water containing 1 per cent. sodium nitrate after hours of incubation.		
	48	96	144
Control .. .. .	gr. 0.016	gr. 0.042	gr. 0.084
Exposed to sun for 24 hours	gr. 0.01	gr. 0.032	gr. 0.14
Stood in room to dry for four months .. ..	gr. 0.013	gr. 0.032	gr. 0.079

TABLE IV.

	Nitrous acid produced per 100 cc. peptone water containing 1 per cent. sodium nitrate.		
Days of incubation.	Control: Vibrios taken from soil moistened by capillarity with nitrate broth.	Vibrios taken from soil exposed to drying influences for 1 month.	Vibrios taken from soil exposed to sun for 30 hours.
1	gr. 0.066	gr. 0.00285	gr. 0.0019
5	gr. 0.154	gr. 0.0066	gr. 0.0876
10	gr. 0.161	gr. 0.14	gr. 0.228

Even though after exposing the vibrios in soil to the sun's rays a raised power of reducing nitrates is called forth, it still does not equal that of the organism when recently isolated. The result of keeping *V. cholerae* in various types of water and under anaerobic conditions is shown in the following tables :—

TABLE V.

Number of days the vibrios remained in the various waters.	V. cholerae were placed in			
	Drinking water from the Serino sterilized.	Sea water sterilized.	Sewer water sterilized.	Faecal Emulsion sterilized.
	Nitrous acid produced in 10 days per 100 cc. peptone water containing 1 per cent. sodium nitrate.			
1	gr. 0.244	gr. 0.33	gr. 0.20	gr. 0.21
4	gr. 0.21	gr. 0.33	gr. 0.16	gr. 0.19
8	gr. 0.175	gr. 0.30	gr. 0.16	gr. 0.175
12	gr. 0.175	gr. 0.30	gr. 0.16	gr. 0.175



TABLE VI.

Number of days under anaerobic conditions.	Nitrous acid produced in 10 days per 100 cc. peptone water containing 1 per cent. sodium nitrate.	Observations.
1	gr. 0.161	A control under aerobic conditions gave 0.25 per cent. nitrous acid.
4	gr. 0.15	
8	gr. 0.15	
12	gr. 0.15	

H. S.

SUESSMANN (Ph. O.). **Die Verwendung von Drigalski-Schalen zur Gewinnung von Typhus- und Cholera-Impstoff mit Hilfe eines einfachen Apparates.** [A Safety Apparatus for the Washing off of Typhoid and Cholera Culture from Petri Dishes.]—*Cent. f. Bakt.* 1. Abt. Orig. 1915. June 28. Vol. 76. No. 4. pp. 288–294. With 3 figs.

An ingenious but complicated piece of apparatus designed to enable an inexperienced laboratory attendant to emulsify cholera cultures grown on Petri dishes, with minimum risk of infecting himself and with diminished opportunities of a contamination of the vaccine with air organisms; the whole process is carried on in a closed metal box with glass front, it being possible to wash off in this way some 35 plates an hour. [The keeping clean and sterile of the apparatus would not appear to be an easy matter.]

H. S.

GIESZCZYKIEWICZ (M.) & SIERAKOWSKI (St.). **Ein choleraähnlicher Vibrio.** [A Cholera-like Vibrio.]—*Cent. f. Bakt.* 1. Abt. Orig. 1915. Aug. 25. Vol. 76. No. 7. pp. 465–469.

Isolated on Dieudonné from the rice water stools of a patient whose only symptom was diarrhoea, the vibrio while being morphologically like *V. cholerae* did not agglutinate with nor absorb from a true cholera serum. It was virulent for guinea-pigs and pigeons, proving fatal for the former in the dose of 1 mg. intraperitoneally and for the latter in the dose of 1 loop intramuscularly. Grown on blood agar plates the vibrio caused marked haemolysis. By passing a 10 days old broth culture through a Berkefeld filter very little exotoxin could be detected, 5 cc. of the filtrate being needed to kill a guinea-pig. No marked agglutination affinity to a number of other well-known cholera-like vibrios could be found.

H. S.

GREENWOOD JUN. (M.) & UDNY YULE (G.). **The Statistics of Anti-Typhoid and Anti-Cholera Inoculations and the Interpretation of such Statistics in General.**—*Proc. R. Soc. Med.* 1915. July. Vol. 8. No. 9. (Sect. of Epidemiol. & State Med.). pp. 113–190.

Concerned almost entirely with the statistics of anti-cholera inoculation and their interpretation, the paper is divided into four sections. Section I. deals with the conditions under which data

are valid. Section II. examines the existing data. Section III. puts forward a statistical theory for the interpretation of the results of inoculation. Section IV. views the possibility of a comparison of efficiency of immunisation in the case of different diseases.

*Section I.* In determining the result in respect of immunity to a certain disease ensuing to a portion of the population from the inoculation of that portion with the organism of the disease in question, it is necessary to decide (1) whether there is a significant difference between the attack (or fatality) rate of the inoculated and the uninoculated portions ("Is the observed difference greater than we could fairly attribute to the action of chance?") and (2) if so, to what extent the inoculated portion profits by that treatment, and how one may compare one set of data with another.

To attempt this one must be supplied with valid data, i.e. data which conform to the following conditions:—(a) The inoculated must resemble the uninoculated in all material respects, e.g. age, sex, and social and racial constitution, unless it is known that these do not exert influence in respect of the disease. (b) Exposure to the disease must be equal for the inoculated and uninoculated. An inoculated population of one year may not be compared with an uninoculated population of another year, unless it is known that the disease remains constant with regard to infectivity and severity year in year out, which is not the case with cholera. The cases or fatalities among inoculated and uninoculated are not comparable, if it took an appreciable portion of the time of epidemic to carry out the inoculation, some of the inoculated in that case being exposed to the disease, *as inoculated*, for periods shorter than the whole time of epidemic, while the uninoculated naturally are exposed throughout all the epidemic. (c) There must of course be no question of conscious or unconscious bias in the classification of cases, where doubt exists as to whether inoculation has or has not taken place or where the diagnosis of the disease is uncertain.

A guarantee of the accuracy of data is obtainable when one has a series of observations on the attack, or fatality, rates in various outbreaks of the same disease. The returns for inoculated and uninoculated bear a definite relationship to one another in every case. A departure from this correlation would indicate the untrustworthiness of the data. In addition to the above conditions necessary for the reliability of the data, these data must be based on a sufficiency of observations, obviating the interference of chance. To decide whether the difference in immunity observed as the result of inoculation is a real one or merely a chance grouping of figures, it is necessary to examine the figures and this is generally done with the aid of the criterion which was introduced by Professor PEARSON and is stated as follows:—"If we know *a priori* that a table containing  $n$  "cells" should include  $m_1, m_2, m_3 \dots m_n$ , observations in the respective cells, then, if the standard errors of sampling and the correlation in errors of the various cells are of a certain form, the probability that fluctuations of sampling alone would give rise to a system of deviations  $m_1 - m'_1, m_2 - m'_2 \dots m_n - m'_n$  where  $m'_1, m'_2, m'_3 \dots m'_n$  are the actually observed contents of the "cells," or to any system of wider deviations, is a function of 
$$\frac{1}{mn} \frac{(m_n - m'_n)^2}{mn} = \chi^2.$$
"

It is found that "if the number of subdivisions be 4 and  $\chi^2$  computed as above on the basis of some assumed theoretical distribution be 1, then the chance (P) is about 8 in 10 that errors of sampling would lead to as great a discrepancy as or a greater discrepancy than that actually observed between theory and observation." With an increase in the value of  $\chi^2$  the likelihood of the difference being due to chance rapidly diminishes, thus with  $\chi^2$  equalling 17, P is less than 1 in 1,000, and with  $\chi^2$  equalling 30, P is only 1 in 1,000,000. The authors consider that this  $\chi^2$  criterion possibly errs on the side of caution and that perhaps to ascertain the degree of probability that the difference between  $\frac{\text{inoculated attacked}}{\text{all inoculated}}$  and  $\frac{\text{uninoculated attacked}}{\text{all uninoculated}}$  might be due to chance would be a sufficient precaution.

In *Section II.* data from various sources are examined. From HAFKINE's eight tables are drawn up and the  $\chi^2$  values calculated; only in three cases is  $\chi^2$  greater than six for which  $P=0.11$ .

TABLE III.—Calcutta, 1894-96. Persons exposed from Fifth to Four Hundred and Sixteenth Day after Inoculation.

		Not attacked.	Attacked.	Total.
Inoculated	.. ..	276	3	279
Not inoculated	.. ..	473	66	539
		<hr/>	<hr/>	<hr/>
Total	.. ..	749	69	818
		<hr/>	<hr/>	<hr/>

$\chi^2=29.70$ .  $P=\text{less than } 0.0001$ .

TABLE IX.—Margherita Coolies. Inoculations during an Epidemic, 1895. Vaccines I. and II.

		Not attacked.	Attacked.	Total.
Inoculated	.. ..	192	4	196
Not inoculated	.. ..	113	34	147
		<hr/>	<hr/>	<hr/>
Total	.. ..	305	38	343
		<hr/>	<hr/>	<hr/>

$\chi^2=37.92$ .  $P=\text{less than } 0.0001$ .

TABLE X.—Cachar Tea Estates Coolies, 1895-96. Vaccine II.

		Not attacked.	Attacked.	Total.
Inoculated	.. ..	5,751	27	5,778
Not inoculated	.. ..	6,351	198	6,549
		<hr/>	<hr/>	<hr/>
Total	.. ..	12,102	225	12,327
		<hr/>	<hr/>	<hr/>

$\chi^2=111.92$ .  $P=\text{less than } 0.0001$ .

These three tables III., IX., and X. furnish evidence of the value of HAFKINE's inoculations.

POWELL's results are included in the Cachar figures of HAFKINE.

MURATA's data are poor and supply only two cases (see Tables XVII. and XXV.) giving the  $\chi^2$  standard, but while one of these favours inoculation, the other would counterindicate its use. MURATA used a high temperature (60°) for killing his vaccine and gave apparently only one small (2 mg.) dose.

TABLE XVII.—Koobe.

		Not attacked.	Attacked.	Total.
Inoculated ..	..	14,939	20	14,959
Not inoculated ..	..	243,328	753	244,081
		<hr/>	<hr/>	<hr/>
Total ..	..	258,267	773	259,040
		<hr/>	<hr/>	<hr/>

$$\chi^2 = 14.48. \quad P = 0.0024.$$

TABLE XXV.—Ibo.

		Not attacked.	Attacked.	Total.
Inoculated ..	..	9,587	3	9,590
Not inoculated ..	..	86,032	1	86,033
		<hr/>	<hr/>	<hr/>
Total ..	..	95,619	4	95,623
		<hr/>	<hr/>	<hr/>

$$\chi^2 = 18.7. \quad P = 0.0003.$$

NIJLAND does not give details as to how his vaccine was prepared or given; his figures are mainly approximations; so that though six out of his eight tables fulfil the  $\chi^2$  test, prophylactic inoculation is not materially supported by his statistics.

ZABOLOTY's data are considered by the authors to be unuseable owing to lack of detail.

From the most of SAVAS's data it was found difficult to extract reliable information owing chiefly to the fact that inoculation was for the most part a long drawn out process taking place during the epidemic. It is clear that those of the population who received their inoculation late in the epidemic were exposed, as inoculated persons, to the disease not only for a shorter period than the epidemic lasted, but also to it when it was less virulent, it being always the case that infectivity declines during a cholera epidemic. The results of inoculation in the Sanitary Corps of the Greek Army are, however, considered of the greatest value. This body of men was inoculated before cholera broke out, this being in the opinion of the authors the only vital difference in respect of immunity between them and the combatants, with whom they are compared in Table XXXIX. The Sanitary Corps and the combatants belonged to the same social class, the fact that the former had had a short course of sanitary instruction being counterbalanced, in the authors' opinion, by the fact that from the nature of their occupation they were exposed to infection to a greater degree than were the combatants.

TABLE XXXIX.—Savas's Data.

		Not attacked.	Attacked.	Total.
Sanitary corps	..	2,884	13	2,897
Combatants	..	112,613	2,192	114,805
		<hr/>	<hr/>	<hr/>
Total	..	115,497	2,205	117,702
		<hr/>	<hr/>	<hr/>

$$\chi^2 = 32.79. \quad P = \text{less than } 0.0001.$$

Summarizing these various data the authors come to the conclusion that inoculation against cholera does result in benefit to the inoculated.

*Section III.* discusses the problem "whether any hypothesis as to the meaning of immunisation can be found of sufficient definiteness to enable us to predict the form" of a single-valued functional relation, existing between the death- or attack-rates of inoculated and uninoculated. The theory promulgated is then tested on data furnished by cholera inoculation, swine fever, diphtheria, scarlet fever and infantile mortality statistics.

In *Section IV.* the possibility of a comparison of the efficiency of inoculation in the case of one disease, say cholera, with that of inoculation in the case of another, say typhoid, is discussed at length and the decision arrived at that none of the various coefficients proposed supplies a statistical measure.

The authors consider it a mistake for statisticians to devote themselves entirely to such mathematical difficulties; they should give due attention to the biological difficulties of interpretation which are encountered.

H. S.



## TROPICAL DISEASES BUREAU.

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## APPLIED HYGIENE IN THE TROPICS.

By COLONEL W. G. KING, C.I.E., I.M.S. (Retired).

## REPORTS.

## JAIL ADMINISTRATION IN INDIA.

The following information on matters affecting the health of convicts is obtained from the Reports on Jail Administration of the various Provinces in India, during 1914 :—

*Bihar and Orissa* (Inspector General of Prisons, Lt.-Col. B. J. SINGH, I.M.S.).—

The daily average convict population was 7,007. The average daily sick rate was 28·8 per mille, the death-rate 16·9 per mille, the lowest rate of the previous four years.

“Of the 16,572 convicts discharged during the year from the Central and District Jails, 9,437 or 56·95 per cent. gained weight, against 55·01 per cent. in 1913; 3,102 or 18·71 per cent. lost weight against 20·15 per cent. in 1913, and 4,033 or 24·34 per cent. neither gained nor lost weight against 24·84 per cent. in 1913.”

Malarial fevers formed the chief cause of admissions to hospital, 960 cases with but two deaths, or at the rate of 0·3 per mille of the population; the highest death-rate (3·5 per mille) was caused by lung tubercle, the next by dysentery (2·7 per mille). With the exception of four jails, quinine was issued in all as a prophylactic during the rainy season. The general weekly dose was 10 grains. All usual anti-malarial measures, including oiling, were carried out in all jails. Separate accommodation for tuberculosis patients existed at only five jails; but a special hospital for such patients is being erected at Gaya, and proposals for separate wards in other jails are being formulated.

Boys under 15 years of age whose sentences are below three months are sent to a Reformatory School at Hazarobagh, but all under 20 years of age whose sentences are above that period were, during 1914, sent to a juvenile jail, the institution of which was advised by Lt.-Col. Singh in 1913. This is conducted solely upon the Borstal system. The results secured during the year are thus summarized :—

“Two hundred and twenty-one of the boys admitted were discharged during the year, and 142 remained in confinement when the year closed. Very fair progress was made during the year in connection with the general education and industrial training of the inmates. A number of them

became proficient in reading and writing Hindi, Urdu and Oriya, and in elementary arithmetic, while over 30 per cent. acquired a good practical knowledge of drill and gymnastics."

*Burma.* (Inspector General of Prisons, Lt.-Col. BELL, C.I.E.).—

The daily average number of prisoners was 16,652. The daily average number of sick was 14·89 per mille, and the death-rate 17·66 per mille. Admissions for malarial fevers were 22·2; for dysentery, 16·23; pneumonia, 4·97; diarrhoea, 7·38 per mille. Tuberculosis yielded the heavy death-rate of 4·58 per mille. In one jail, special accommodation for cases of this disease is under construction.

Quinine was issued as a prophylactic "in nearly all the jails in the Province." The rate for pneumonia was much above the average owing to admissions from one jail. The Superintendent of the jail concerned regards pneumonia as "endemic" in the jail, and assigns as exciting causes exposure to dust in wheat grinding by hand mills—a form of penal labour largely enforced in other jails in the Province—chills after such labour, and occasional septic mouths.

In six jails, in addition to rice diet (unpolished), beans were the only form of pulse used throughout the year; in the others from time to time various lentils, meat or fish was substituted.

In the Rangoon jail, where a few cases of scurvy appeared in 1912, there is now issued a ration of uncooked lettuce. There were however four cases during 1914.

In all jails, of the number discharged during the year (25,166) 55 per cent. gained weight, and 19 per cent. lost weight, whilst 25 per cent. neither lost nor gained.

Offenders below the age of 15 years were confined in a Reformatory School. A juvenile jail at Meiktila is reported to have done good work in training boys to handicrafts. When conduct has been satisfactory, sets of tools are given on discharge. "In addition to trade taught, every prisoner had one hour's physical drill and two hours schooling a day."

In all the large jails in Burma cooking is carried out by the employment of steam. Some years back this was further utilized for disinfection. All clothing of new admissions is disinfected before storage, and all clothing and bedding of cases of dysentery and diarrhoea, tuberculosis and infective diseases in jail are likewise treated. During 1914, Thresh's disinfectors have been supplied to five more jails. In one case there is in employment, experimentally, a steam chamber for sterilising plates in the kitchen.

A special ward and enclosure for cases of tuberculosis is in process of erection in Mingyan.

*Bombay.* (Inspector General of Prisons, Lt.-Col. JACKSON, I.M.S.).—

The daily average population of prisoners during 1914 was 11,361. The daily average number of sick was 27·28; the death rate 18·2 per mille. The death rate exceeded that of the previous year (15·6) consequent upon deaths from gunshot wounds in the Belgaum Jail. Mumps was prevalent, three jails between them reporting 453 cases. The Inspector General makes the following remarks on the subject :—"The disease may be spread by a carrier; it was mild in type. I believe myself that the regular use of antiseptic mouth washes by all the inmates of a prison is of considerable use in getting rid of the disease though some medical officers do not concur."



Of the prisoners discharged during the year (20,427) 55 per cent. gained weight, 23 per cent. lost, and the rest neither gained nor lost weight.

\* The diet hitherto employed presented to the convict much the character of a lottery, in that the same weight of wheat, jowari (*Soorghum vulgare*), nagli or ragi (*Eleusine coracana*), bajri or cumbu (*Penicillaria spicata*) was given.\* But, under a recent order of the Bombay Government, the convict will not often, so far as diet is concerned, have reason to regret leaving his hut to be the Inspector General's guest at public expense. That officer states the following changes have been ordered by the Bombay Government :—

- " (1) Issue of wheat and rice in lieu of bájri and jowári.
- " (2) Issue of 2 ounces of extra flour and one ounce of molasses to working prisoners in the Deccan gang.
- " (3) Issue of wheat in lieu of bájri and jowári at the Sind Gang.
- " (4) Issue of extra rations to weakly prisoners and convalescents.
- " (5) Issue of quinine as a prophylactic.
- " (6) Issue of potatoes and onions in lieu of green vegetables.
- " (7) Issue of extra warm clothing when considered necessary.
- " (8) Inoculation by Professor Haffkine's prophylactic serum."

*Punjab.* (Inspector General of Prisons, Lt.-Col. G. W. BRAIDE, I.M.S.).—

The daily average prison population was 14,982, the Hospital admission rate 613, the daily average number of sick 33, and the death-rate 25·49 per mille. The mortality rate is in strong contrast with that of 1913, when it amounted to 16·40. This unfortunate result was chiefly contributed to by three jails, one of which returned a death-rate of 55·80 against 18·13 in the previous year. This affords an acute instance of results of change of methods of sanitary care and discipline, which the Jail Department throughout India has had to contend with, following removal of officers of the Indian Medical Service long trained to charge of jails, owing to war exigencies. Their successors have had before them the difficult task of performing technical duties that are only to be acquired by practical experience.

The admission rate for malarial fever was 104 per mille, and the death-rate 0·22. This the Inspector General considers satisfactory, seeing that, although the average daily population was in round numbers only 15,000, the population passed through the jails was 32,650. He ascribes this result largely to the use of quinine as a prophylactic, given during the autumn in 15 grain doses once weekly.

The Punjab jails have for a long period returned a high rate of mortality for tuberculosis; in 1914 this amounted to 7·4 per mille. Selected Sub-Assistant Surgeons have now been specially trained, and have been attached to each Central jail, so as to secure early recognition and segregation of cases. Major E. L. WARD, I.M.S., Superintendent of the Lahore Central Jail, thus refers to action taken :—

" All suspicious cases are now dealt with systematically. Isolation, examination of sputum, and disinfection of clothing; also of barracks and workshops from which suspicious cases are received. These measures have, in my opinion, helped to lessen the incidence of the disease. The Nascent Iodine treatment has recently been tried with a good measure of success in our Tubercle Ward. Roughly, the treatment depends on the liberation of free iodine from iodide of potassium, in the blood, by the action of chlorine. In glandular cases it has been particularly successful."

\*[See this *Bulletin* (Sanitation Number), Vol. 6, No. 5, p. 274.]

For juveniles, a Reformatory School and Juvenile Jail is in operation, and the Punjab Government, in reviewing the Report, states that "as soon as the Province regains its full staff of expert Superintendents, the Lt. Governor hopes that it will be possible to organise further progress on the lines [Borstal system] that have led to such good results in England and elsewhere." The Inspector General gives the following opinion as to the applicability of this system to the Punjab :—

"We may not in India be able to achieve the brilliant results obtained in England by this special treatment of the young criminal; but there can be no doubt, whatsoever, that the Indian prisoner has responded to it in a remarkable way, and as our methods improve, so will he."

*The United Provinces.* (Inspector General the Hon. Lt.-Col. C. MacTAGGART, C.I.E.).—

The daily average population was 24,911, being 14·1 per cent. greater than in the previous year. The increase, the Inspector General suggests, was due to the incentive to crime of famine prices of food grains, during a portion of the year. When to this fact is added the disturbance of staff consequent upon war demands, there is room for coinciding with his opinion that a mortality rate of 11·9 per mille against 11·5 in 1913 was satisfactory.

There were 34 admissions for cholera in the jails. In the Barcilly Central Prison, where 25 of the total cases occurred, the infection is held to have been fly-borne from a neighbouring infected village.

A system of prison administration which permits of the small mortality stated is not likely to have much wrong with its ration allowance. Nor when tested by hard labour is the evidence of the weightments against its suitability; as, in this case, it is recorded that "of the prisoners discharged from the jails during the past year 64·9 per cent. gained weight, 9·7 per cent. lost weight, and 25·4 per cent. neither gained nor lost weight. There is practically no difference in these figures from year to year." At page 40 the Inspector General not only details the diet in use but shows how he adjusts its nutritive value in reference to the constituents of the various grains available, to absence of which precaution allusion is made in the preceding notice of the Bombay Jail Report. The method pursued in the jails of the United Provinces may be useful elsewhere, and is reproduced in Notes under Food.

#### TUBERCULOSIS IN SOUTH AFRICA.

The condition of mine workers in respect to pneumonia and tuberculosis in South Africa and the possibility of spread hence to other communities, have attracted attention for some time. The Government of the Union of South Africa appointed a Commission in 1912 to ascertain and advise as to the facts. The results of this enquiry are now available in the form of a Parliamentary Blue Book.\* The Commission record no claim to original research work, in the absence of facilities in staff and laboratory organisation. They make the reasonable assumption that the difference of locale is unlikely to disturb

\*Union of South Africa. Report of the Tuberculosis Commission, 1914. Cape Town: Cape Times, Ltd., Govt. Printers.

to any important extent the opinions arrived at by the Royal Commission on Tuberculosis of Great Britain. This being so, they have sought largely by means of statistics and evidence of witnesses examined by them to establish the history of origin, nature and extent of tuberculosis infection in men and cattle in communities, and to trace the connection with environment and occupations.

In the matter of statistical evidence, the Commission were naturally handicapped, as a result of defective registration. The chief historical reliance has therefore been based upon the records of early times, and of present day witnesses. In this way, they arrive at the opinion that two generations back there was not a great deal of tuberculosis in South Africa, and that such as existed as to both blacks and whites was confined to coastal communities, in close connection with Europeans. From this, they naturally proceed to discuss the influence of immigration by infected Europeans. They show that possible foci have been largely added to by such immigration. The following table, compiled from a portion of the text of the evidence as to origin of disease in Europeans where the history of origin was traced, will convey an impression on this point; it shows the deaths of Europeans from tuberculosis :—

Period.	Locality.	Imported.	Indigenous.	Total number of unknown origin.
Six years ending 30th June, 1913 1908–1912 ..	Johannesburg	274	178	349
	Bloemfontein	43	25	68
	Cape Govt. Railways			
	Bulawayo	9		9
	East London	15	13	36
	Naauport	9	1	10
	Beaufort West	2	7	10

Of 202 Europeans dying in Cape Town in the years 1906 and 1907, whilst the origin of the disease was not verified, it is stated that 20 per cent. had been in South Africa less than one year.

The Commission hold that there is evidence that the aggregation of consumptives in certain Karoo villages has “formed foci from which the disease has spread, and that, in this connection, the influence of the length of time where mail communication has been available is distinctly traceable.”

From statistics covering the period 1904–11, it is concluded that in Cape Province, amongst Europeans in urban areas, the average deaths from tuberculosis amount to 9·67 per cent. of all causes. In the case of “other than Europeans,” the rates are 17·81 and 13·43 respectively. In the Transvaal, the rates for Europeans are 8·4 for urban and 2·9 for rural areas, and for other than Europeans the corresponding rates are 14·3 and 9·4 respectively. In the Orange Free State, registration of deaths of Europeans only is carried out, and this seems to be still imperfectly conducted.

"The average percentage in all causes of deaths from tuberculosis between 1904 and 1911 was 7·4. In the Transvaal, the statistics are particularly unreliable for rural areas, but are fairly correct for urban areas. In interpreting them, it must be remembered that the mining industry and the accompanying prevalence of pneumonia and tuberculosis are to be found and yet thus the whole truth cannot be demonstrated, as the natives form a fluctuating population, they being largely recruited from distant areas." "The figures available from 1902-1911 show that tuberculosis was the cause of deaths in Europeans in urban areas to the extent of 8·4 per cent. of all other causes, and that in case of other than Europeans the rate was 14·7 per cent."

The Commission make the following remarks as to classification of tuberculosis in mine workers :—

"As far as the registration of deaths is concerned, it is very doubtful to what extent deaths recorded as miner's phthisis were really due to silicosis and what to tuberculosis. It is not infrequently assumed by the uninformed that any case of tuberculosis which has originated on the mines should be termed miner's phthisis. On the other hand, in the majority of advanced cases of this disease the tubercle bacillus is present in the lungs. On the whole, therefore, we have considered it best to include the deaths returned as miner's phthisis in all of the tables. . . . The actual number of deaths registered from miner's phthisis is not great, as the following figures show."

They arrive at the conclusion that amongst Europeans in the Transvaal tuberculosis "does not prevail to any serious extent except in urban areas, and that it is found chiefly amongst the males associated with mine labour." As to natives, however, their report is as follows :— "So far as the statistics go, they indicate that a very severe mortality both from tuberculosis, from pneumonia, and from all causes is taking place in the urban and especially the mining centres, and that the mortality from tuberculosis is on the increase. Outside of these areas, the death registration affords us no information."

In Natal, again, incomplete statistics rendered the task of the Commission difficult. Natives are excluded, but statistics as to indentured Indians are available. On the subject of mortality of Europeans they are able to express the following opinion :—

"Assuming that registration is complete, and that the numbers of the population to which they are referred are correct, it would seem that the mortality from tuberculosis is comparatively small among Europeans in Natal. Moreover it would appear that the amount is diminishing in the urban areas. The mortality per 100,000, in 1909, was in urban areas: Phthisis 60, other forms 10; in the rural areas: Phthisis 40, other forms 9."

In the population of indentured Indians the tuberculosis death-rate was in 1911, 3·7 and amongst free Indians 2·5 per mille. They hold that tuberculosis "is of very much greater occurrence among indentured than free Indians." In this connection, attention is drawn to the fact that the age constitution of the two populations differs and a table is given distinguishing between persons under and over fifteen years of age. It is then seen that the rate is somewhat in favour of the indentured adults, the apparent increased rate being due to greater incidence of the disease upon children. This the Commission ascribe to Indians engaging their children upon labour, and the consequent undesirable strain upon them diminishing resistance to infection.

The death-rate from all causes amongst Indians compares favourably with that found in many parts of their own country; thus, in the three years ending 1911, the average for those indentured was

12·3, and for the unindentured 23 per mille. In these cases, the checking of tuberculosis is largely connected with improvement in dwellings and general sanitary conditions.

Were special measures against tuberculosis amongst Indians taken, an important step towards a decreased death-rate would at once result, but there would remain to be considered a special liability to death by pneumonia (2·5 per mille) as well as "deaths of women in the puerperal state and from suicide and violence." More care in selection at recruiting depots in India would also seem essential; as 37 per mille were affected with tuberculosis on arrival in South Africa and, according to Dr. Nicol BURTON, 800 to 900 per mille suffer from ankylostomiasis [p. 93].

In discussing the existence of infection amongst natives of South Africa, the Commission state that the problem of prevention is not so simple as in the case of Indians. The Commission represent the average life to be one of freedom and of simple habits combined with considerable laziness, when compared with the average strenuous life of more civilised races.

"Mere removal from these conditions acts indirectly upon general health. The tendency is towards increased civilisation and in reaching this goal the route is obvious. Thus for the simple blanket, put off as he feels hot or cold, the native is fast substituting second-hand European clothing, often of far too thick a texture for the African climate during the day, and this wet with perspiration, and unremoved at night fall, subjects him to chill. His hut is devoid of ventilation, and he sleeps with his head covered by a blanket or other covering devoid of cleanliness. In ordinary body cleanliness he is described as fairly clean, but he possesses one bad and invincible habit, that of incessant spitting promiscuously about, which is important from the point of view of tuberculosis. The diet consists largely of maize with irregular supplies of vegetables and very occasional meat. He drinks "Kaffir beer" of but small alcoholic strength; now there is a popular belief that this possesses antiscorbutic properties. In advanced areas, he has an undesirable penchant for beer of foreign make and great alcoholic strength."

This is the African native, who in the midst of the conditions incident to mine labour, where presumably the "invincible habit" of promiscuous spitting is not abandoned, yields largely to pulmonary tuberculosis. On return to his place of origin, the infected native does not seem to have caused rapid increase of tuberculosis amongst those with whom he is brought in contact. He lies largely in the open air and the sputa are more liable to be exposed to sun action, and further the life of the infected is short as the course of the disease in the African race is rapid.

Statistics are quoted as to four important mines in the Rand. The average annual death-rate (presumably in a population of adult males, and subject to quick removal of the unhealthy and substitution by fresh recruits) was between 1903-1912 21·77 per mille; the tuberculosis death-rate was 2·15 and the pneumonia death-rate 14·22. Scurvy is said to be "exceedingly heavy in its incidence."

An important point in an enquiry as to causation of disease incidence necessarily is whether there is any difference between underground and surface workers. This the statistics clearly show, though in other respects the workers live under similar conditions.

They found [p. 158] that "pneumonia is three times as common, and the mortality nearly four times as great in the underground worker as in the surface worker, and the case mortality is half again as great. Also other respiratory diseases are over four times as frequent underground, but as the case mortality is only a quarter of what it is on the surface, the rate of mortality is not greatly increased. Both illness and mortality from other causes are also considerably greater in the underground worker, but as the increase in the number of cases is greater than the increase in the rate of mortality, the average case mortality is not increased."

The recommendations as to mine workers deal with measures calculated to increase resistance to infection by improved arrangements in diminishing working strain, regulation of diet, increase of the small cubic space in dwellings from 200 feet to the still small allowance of 300 feet, the use of portable steam disinfectors for clothing and blankets.

Surgeon-General GORGAS on inspecting these mines some time back placed stress upon the use of "locations" as against barrack life; that is, he estimated that, under a condition where family life was possible, better feeding and better hygienic arrangements generally would supervene, and thus resistance would be raised. His own experience in Panama pointed to this measure being beneficial in decreasing tuberculosis. The Commission however have not acted on this suggestion, under the belief that the rest and change incident to visits at intervals to distant homes was more likely to be beneficial.

On the subject of mine dust, the Commission advise as follows:—

"In view of the particularly harmful effects of air-vitiation and the inhalation of siliceous dust in predisposing to tuberculosis and pneumonia, it is essential that every effort be continued, pursuant to the Mining Regulations, to secure adequate air-change underground, and the adoption and enforcement of the methods prescribed from time to time for the prevention and allaying of dust."

Descriptions are given of the dust obtained from these mines. The following is selected as sufficiently characteristic of the others:—  
"Sample from the *Dutoitspan Mine* -none of the fragments appear to be much over 0.1 mm. in diameter. The dust is more generally crystalline than the others. Quartz crystals are frequent."

The influence of spread of dust by blasting is thus alluded to:—  
"It is now recognised that the chief factor in dust distribution is the effect of blasting operations, and it is not the coarser dust which is so injurious, as the finer particles forming the 'haze' in the mine atmosphere, and it is this which requires a long time to clear."

As to dissemination of infection the Commission remark:—

"It is difficult, if not impossible, to prove definitely that any given condition does actually spread the infection of tuberculosis or pneumonia; but if we admit that these diseases are spread by infection, then . . . among such conditions are:—

"(a) The admission of tuberculosis workers into the compounds and mines.

"(b) Conditions of the compounds favouring the retention and diffusion of infection when introduced, i.e., bad lighting, inefficient ventilation, uncleanness.

"(c) Overcrowding and other conditions bringing the healthy into contact with infection either already existing free, or being given off by an infective individual."

The Commissioners state:—

"Inhalation of such dust should be capable of producing pulmonary irritation and fibrosis. And short of this it would seem likely that it is a

factor predisposing to pulmonary tuberculosis and pneumonia. There is, however, no record of the occurrence of miner's phthisis among the Kimberley miners."

To this opinion Dr. PORTER adds a dissenting Note :—

" This is an unproven assumption, which may or may not be true in regard to pulmonary irritation and tuberculosis, whilst, as regards fibrosis, it is in direct conflict with lengthy medical experience in Kimberley. Moreover, no information is given as to the comparative *amount* of dust in the air of each mine."

#### KINGSTON, JAMAICA.

Under the notification system, during 1914, in Kingston the incidence per 1,000 of the population was, of tuberculosis 3·49, enteric fevers 6·34, and of all infectious diseases exclusive of tuberculosis 8·13. The total death-rate from all causes was 26·83 and the birth-rate 36·59 per mille of the population; the infantile death-rate per mille of births was 231.

Dr. Oliver CROSSWELL,\* Acting Medical Officer of Health, urges better protection of the river source of water-supply, and the necessity for increased storage as a purification measure. He specially animadvertes upon the existence of slum dwellings, urges that the expenditure necessary be made and hopes " to be able to persuade the Mayor and Council to put forth a special effort to clean up these insanitary areas." The heavy incidence of enteric fevers and tuberculosis would certainly show that the Council has before it a task of dealing with diseases that can be successfully prevented.

#### BASUTOLAND.

The Principal Medical Officer, Basutoland, in his Medical Report for 1914, makes the following remarks as to the prevalence of typhoid. It is not stated what preventive measures have been found feasible, and, having regard to the scattered nature of the communities dealt with, the problem probably presents difficulties :—

" There has been a severe outbreak of enteric fever. Six hundred cases were seen at the dispensaries and 112 were admitted into Hospital, of whom 20 died. Many of the latter were brought long distances, and were in the second week of the disease before admission. The 600 cases seen as outpatients do not represent more than a tithe of the total number of cases in the territory. Reports of severe outbreaks with a higher mortality were received from missionaries, traders, and others."

#### GUAYAQUIL.

Whilst it is well known that the organisation of the Panama Canal is such that *per se* it offers not a menace to health of communities elsewhere but a model of sanitary effort, there can be no doubt that Guayaquil is a possible source of explosive epidemics of plague, yellow fever or small-pox. This fact in part has necessitated some diplomatic pressure from the U.S. Government, which is apparently now bearing fruit. According to a Report by Dr. BECERRA, Director of the Public Health Department, for 1914, the radical improvement of introducing a sound water supply is already in progress under the British firm of J. G. White & Co., Ltd.

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\*M.S. Report on the Sanitary Condition of the City and Parish of Kingston for the year 1914-15.

As to plague, 443 cases were admitted to Hospital treatment. The mortality is stated to have been only 35·66 per cent. against, among 779 cases in 1913, 39·27 per cent. Both results are of a record nature. They are still more so when viewed by the following remarks by Dr. PEREJA :—

“ Of Bubonic Plague 443 cases have been attended to of which 158 were fatal giving a death-rate in full of 35 per cent. but, as I have already expressed on another occasion, many of the fatal cases in our Pest-house were received in such an advanced stage of the disease that it was impossible to apply any effective treatment with good results. Therefore if we consider in the percentage noted those cases that have remained in the Pest-house over 24 hours and in consequence were enabled to get the benefit of the treatment by serum, we will have out of 328 cases treated 83 deaths which gives us a twenty-five per cent. death-rate ; a percentage much lower than the one of past years in so far as regards the death-rate. The number of cases treated also shows a progressive reduction in the disease as is proved by the important reduction of 331 cases in favour of the year just passed.”\*

Unfortunately Dr. PEREJA does not state what particular “ serum ” was employed by him in these cases. Under any method of treatment hitherto employed such results are unusual.†

Whilst in 1913 there were 342 yellow fever cases, in 1914 there were only 42. This decrease is assigned to systematic attention to a “ well determined focus of infection some distance from the centre of the city, and of which the Sanitary Department were at once informed.” By tracing such foci and obtaining prompt reports of occurrence, it is hoped the disease will be got rid of.

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\*M.S. Report on Bubonic Plague and Yellow Fever at Guayaquil during the year 1914, dated March 15, 1915.

†According to Dr. STRONG and his colleagues, who visited Guayaquil in 1913, the type of plague there is very mild as compared with that seen in the East.

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## DISEASE PREVENTION.

## MALARIA.

*Mosquito-Eating Fish.*

In the Report of the Bureau of Health for the Philippine Islands for 1914, the Director of Health (Dr. HEISER) reports:—

"A supply of fish (*Gambusia affinis*) were obtained from Hawaii and placed in the fish ponds of Tondo, the esteros, fountains, etc. Up to the present time these mosquito-eating fish have proved of very little service because the mud fish, the local name of which is *dalag*, devour the mosquito fish. In fountains and other places where the mosquito fish were unmolested they kept the water free of mosquito larvae. In the opinion of Mr. Seale, the fish expert of the Bureau of Science, the *Gambusia affinis* will gradually establish itself and multiply in spite of its enemies."

*The Breeding of "Millions."*

The Malaria Board Bureau, Kuala Lumpur, has undertaken experimental breeding of "millions" under various conditions. The following conclusion is arrived at:—

"We will here only draw our conclusions on this point from the culture in the gardens tank. Here the fish were regularly fed, free of natural enemies, and undisturbed for a long period. Yet although we did get thousands where we only placed in tens, nevertheless *millions* were not produced as we had hoped. In fact, in spite of all the varying conditions in which they have been placed, they have not proved prolific breeders so far. It is quite possible that we have an exaggerated idea of their powers in this respect. . . . To summarize, we have very good evidence that we will be able to naturalize this fish and *ipso facto* they will be efficient anti-malarial agents."\*

*Mosquitoes.*

During 1914, Dr. STANTON examined several thousands of mosquitoes, specimens sent to him for this purpose. It was ascertained that the "mosquito fauna of Java, Sumatra and Borneo correspond closely to that of the Malay Peninsula," and that, contrary to usually received opinion, the *maculata* and the *umbrosus* are present in Sumatra. A new species of larvae related to *Anopheles culiciformis* of India was obtained from the water in cut bamboos, but no specimen of the adult insect has so far been taken. A new species of anopheles was recorded from Lampongs, Sumatra, and a new species of *Phlebotomus* (*P. stantoni* Newstead) from the Federated Malay States.

Mr. C. STRICKLAND, the Travelling Medical Entomologist, in a discussion as to the presence of malaria in reputed healthy localities of Morib states\*:—

"We can . . . say, with some certainty that *rossi*, if infected at all, is only so to a much less degree than the others. Further, although *sinensis* has been found to the extent of about 2 per cent. to be infected, yet its presence in great numbers in certain districts without causing any fever is in marked contrast to what we read of the amount of sickness caused by *umbrosus* and *ludlowi*; it is, therefore, probably less infective than these two species. We have only a little indirect evidence which shows that probably *umbrosus* is not so infective as *ludlowi*."

\*Federated Malay States Medical Report for the year 1914.

He arrives at the following conclusion :—" If we knew the relative infectivity of the various species, then in any situation we could soon find out the relative amount of harm which was doing by taking a mosquito census."

### *Montserrat.*

In his Annual Medical Report for 1914 the Senior Medical Officer (Dr. J. C. McPHERSON) states :—

" As regards malaria, it has often been reported that no anopheles existed here which might act as a carrier, but specimens of the *Cellia argyrotarsis* have been found at Elberton, and it is interesting to note that 'fever' was said to be at one time very common in this region, possibly of malarial origin."

### *Antigua.*

The area of this island is not great but the anti-malarial measures, as elsewhere, may be classed as major and minor in nature. Dr. W. M. McDONALD, the Medical Superintendent, in the Medical Report for 1914, makes the following remarks illustrating the possibility of the utility of Sanitary measures being minimized by absence of attendance to details :—" Mosquitoes have been very prevalent and troublesome. Practically no attempt is made to tackle the mosquito in question. I understand that the large ponds throughout the Island are stocked with " millions," but no attempt is made to get rid of the small ponds and collections of water." It is understood this representation received prompt official attention.

### *Zanzibar.*

The Acting Medical Officer of Health (Dr. CARMENT), Zanzibar, quotes statistics supplied by Dr. HOWARD, of the Universities Mission Hospital :—In 324 admissions there were 45 " malarial cases " with enlarged spleens. There were 16 instances of filarial diseases ; in 25 cases micro-filariae were found. Dr. Carment has undertaken still incompleted work as to the degree of prevalence of micro-filaria. His examination so far of the prison population, selected as representative of mixed sexes and tribes, yielded one positive case in 14 examined.

The mosquito brigade of Zanzibar originally organized by Major SKELTON, R.A.M.C. continues to do useful work. In the Town District, there has occurred since 1910 a steady decline in the mortality from malarial fevers, as thus shown\* :—

Period.						Death from malarial fever.
1910	..	..	..	..	..	203
1911	..	..	..	..	..	189
1912	..	..	..	..	..	171
1913	..	..	..	..	..	159
1914	..	..	..	..	..	145

\*M.S. Report on the Prevention of Mosquito-borne Diseases during the year 1914, dated 4th June, 1915.





*Federated Malay States.*

The progress of anti-malarial measures in the Federated Malay States must be of general interest to sanitarians in the tropics, in that there has been here a whole hearted endeavour to use not one recognised method but all or any specially suitable for the locality. The Report of the Malaria Advisory Board shows that in the Kuala Lumpur area the excellent results noted in this *Bulletin* [Sanitation Number, Vol. 5, No. 8, p. 478] continued.

In a census population of 58,107, liable to frequent importation of malaria-bearers from the surrounding population, the percentage due to malaria in deaths from "all causes" in 1911 (by the end of which the drainage construction works had made reasonable advance) was 9·8. In 1912, 1913, 1914 the respective rates were 5·8 per cent., 4·2 and 3·9 per cent.

The amount of decreased sickness from malaria represented by this improvement in the death-rate is doubtless considerable in the town population, but is best illustrated by the condition of recruits at the Police Department. This is not placed in completely favourable conditions up to date, as a swamp in its neighbourhood (Butu Road) had still to be treated. It remains an illustration of the necessity for Local Authorities to secure by suitable legislation control over private property, in the health interests of communities. It is reported, "Government have filled up their portion of the land, but nothing has been done on lot No. II. belonging to a private person." Notwithstanding this still existing danger, the incidence of malaria upon recruits, during residence at the dépôt, shows a marked change since the subsoil drainage works were undertaken, as demonstrated by the accompanying chart reproduced from the Report.

As regards expenditure, it is recorded that 1863 feet of sub-soil pipes were laid in Pudu Dam, at a cost of 4,773 dollars.

## SMALL-POX OR VARICELLA.

Dr. John Nivison FORCE and Helen Lowell BECKWITH in a paper entitled "A Laboratory Method for the Diagnosis of Small-pox"\* relates the circumstances of a case which is typical of a problem that occasionally presents itself—a quick diagnosis between a mild attack of small-pox and varicella.

"A. M. H., a student, was admitted to the University Infirmary, Jan. 15, 1915, with the following history: During the Christmas vacation he had occupied a bed with his brother at his home in San Diego. Dec. 30, 1914, the brother developed a rash strongly suggestive of small-pox. The brother was isolated and A.M.H. was vaccinated and the health officer finally decided that the brother had chickenpox and A.M.H. was allowed to return to the university. On Jan. 14, 1915, A.M.H. noticed vesicles on his body. January 16, patient showed scattered vesicles over his body characteristic in distribution and general appearance of chickenpox. January 17 the eruption had become more general and several of the lesions had become umbilicated. January 18, edema of the face; a profuse eruption appeared on the face, body and arms, with many umbilicated pustules and papules on the palms and soles. January 19, maximum temperature 39·4 C. (102·9 F.). January 21, pustule contents were collected and a series of vaccine sensitized rabbits was inoculated intradermally. January 22, the patient was photographed. No reaction occurred in any of the series of rabbits.

"Had the student whose case is here described been first seen at the height of the eruption, and had he not been vaccinated successfully a few years previously he would have offered a splendid exercise in clinical differential diagnosis. It is in this class of "border-line" cases that we hope the skin reactions of sensitized rabbits and guinea-pigs will prove a diagnostic aid."

In discussing the subject they refer to the statement by JENNER that, on the application of variolous material to the scarified skin of persons sensitized by previous small-pox or cow-pox, "there occurs a reaction now classed under cutaneous allergic phenomena. Tréche in 1912 showed that these reactions were not produced in persons immune to small-pox when varicella material was used, and suggests the use of these reactions in differential diagnosis." The authors' review of TRÉCHE's work brought to their attention the desirability of securing skin reaction on sensitized animals which, being kept in laboratories, would be always available; the expert's knowledge of what constituted a typical reaction would be more decisive than if the subject were left in the hands of the average practitioner. They therefore experimented on applying "vaccine virus, small-pox vesicle contents and varicella contents to the skin of previously vaccinated animals," and ascertained results. They found that the intra-dermal injection of the material to be tested on the sensitized animal gave more results than seeding by scarifications.

"The injection was made with a glass tuberculin syringe provided with a 26 gage needle 10 mm. in length. The amount injected was between 0.05 and 0.1 cc. and if properly placed was felt as a small lump in the skin. The intradermal reaction appears within twenty-four hours after the injection, but may not reach its maximum until the second day. It disappears gradually. It is characterised by an infiltration of the skin at the site of the injection, with redness and often heat. The redness fades before the infiltration disappears."

They believe that as "small-pox vesicle contents preserved their properties as allergous for nine days at ice box temperature, it would seem practicable to collect vesicle contents in capillary tubes at the bed side and ship in vacuum bottles, or other suitable containers, to central laboratories for intra-dermal tests on rabbits sensitized to vaccine."

The authors as a result of several experiments arrived at the following conclusions:—

"1. Rabbits sensitized by vaccination with vaccine virus will give a marked intradermal reaction with smallpox vesicle contents in from twenty-four to forty-eight hours, but will not give such a reaction with varicella vesicle contents.

"2. The cutaneous allergy following the original vaccination was present for at least eight months though there had been no stimulation by the allergen during that period. (Rabbit 8).

"3. The intradermal reaction was produced with smallpox material nine days after removal from the patient.

"4. A laboratory diagnosis of smallpox is, therefore, available to physicians and health officers, since vesicle contents may be shipped in capillary tubes to central laboratories and there used for making intra-dermal tests on sensitized rabbits or guinea-pigs."

## THE SANITARY CARE OF LEPEERS.

How far lepers afflicted solely with the anaesthetic form of the disease are a source of danger to a community is still unsettled. In Hawaii\* the tendency is to regard such cases as, at least comparatively, so small a danger that, amongst a people where it has not been possible fully to control the tubercular form, it is unnecessarily harsh to insist upon the breaking of family ties. There is however the manifest danger that in the same subject mixed forms of the disease present themselves. It has therefore been decided to allow reasonable liberty to subjects of the anaesthetic form, whilst retaining them under the following rulings:—

“(1) The patient to report to a medical representative of the board of Health for examination at least once in every three months.

“(2) The patient should not be permitted to engage in any occupation that would necessitate his handling or preparing food for other persons.

“(3) The patient should not live in the same house with children (16 years or under).

“(4) The patient should have separate bedding and table utensils.”

The role of nasal mucus as a possible source of infection is thus [p. 81] referred to:—

“Two inmates of the settlement have been studied carefully, with a view to determine whether they now have leprosy. After several examinations one was declared clean; the other persistently showed a very small number of acid-fast bacilli in the nasal mucus, but no lesions were to be found in the nose nor were there any elsewhere. It was recommended that this case be paroled under the observation of the health department, the view being entertained that as this patient was constantly associating with lepers he might readily have a few acid fasts in the nasal cavities without actually being infected, or, indeed, the acid fasts might not be *B. leprae* at all, as it is well known that a small percentage of healthy persons carry acid-fast bacilli in the nasal mucus.”

This section of the *Bulletin* is not concerned with treatment, but as emphasizing the importance of improving the condition of lepers by placing them under good sanitary conditions and thus raising resistance to the *B. leprae*, the present day faith in treatment by chaulmoogra oil may be referred to. Surgeon HEISER has carried out experiments by hypodermic injections of this oil. The Report above referred to states [p. 80] “The results have been favourable in a general way, though there seems to be but little reason for expecting a definite cure in any of the cases.” This, the writer thinks, is a fair summary as to any method of cure attempted up to date, if the results of ROST’s method, of which he has seen much, be excluded from consideration. ROST’s method, whatever the different opinion of bacteriologists as to what is and what should be the specific microbe concerned, seems to him to have most favourable influence.

The condition of lepers appears to the writer to depend as much upon hygienic conditions as in the case of tuberculous patients, and it is possible that modified sanatorium treatment of a similar character, so far as hygienic measures are concerned, would be in the right direction.

In the large Leper Asylum of the City of Madras, gurgun oil was in use by Surgeon-Major THOMSON, C.I.E. as early as 1876, and chaulmoogra oil in 1880 or probably earlier. The writer is not aware that the one oil has a merit the other does not possess. The treatment by gurgun oil however was a favourite method in 1876. It was administered as a lime water emulsion internally and was applied with friction to the body generally. Improvement of cases resulted.

The writer was in charge of a small leper asylum in Trichinopoly, South India, about 1876-77 and here gurgun oil treatment was also in vogue and was attended with some improvement of the subjects. He believed however that there was probably no specific action in the oil, and that improved diet, skin friction and favourable environment were the real factors. He therefore placed patients in groups: (a) on gurgun oil treatment, (b) on cod-liver oil (internally), (c) the syrup of iodide of iron and (d) on cream. The group on cream, in testimony apparently of the ready assimilation of fat, yielded decidedly the best results. But in the case of both this group and improved members of the other groups, permission to return to their village homes, on temporary leave, always resulted in an aggravation of symptoms.

#### TYPHOID AND WATER DISINFECTION.

The following statistics, showing influence on the typhoid fever rate in cities which have adopted the treatment of their water supplies by hypochlorite of lime, are quoted by the "Engineering Record" of June 13th, 1915, p. 674:—

AVERAGE TYPHOID-FEVER DEATH-RATES PER 100,000 PERSONS.						
City.	Began using hypo.	Before using. Period.	Rate.	After using. Period.	Rate.	
Baltimore .....	June, 1911 .....	1900-10	35.2	1912-13	22.8	
Cleveland .....	Sept., 1911 .....	1900-10	35.5	1912-13	10.0	
Des Moines .....	Dec., 1910 .....	1905-10	22.7	1911-13	13.4	
Erie .....	March, 1911 .....	1900-10	38.7	1912-13	13.5	
Evanston .....	Dec., 1911 .....	1907-10	26.0	1912-13	14.5	
Jersey City .....	Sept., 1908 .....	1900-07	18.7	1909-13	9.3	
Kansas City .....	Jan., 1911 .....	1900-10	42.5	1911-13	20.0	
Omaha .....	May, 1910 .....	1900-09	22.5	1911-13	11.8	

#### TYPHOID IN SYDNEY.

Dr. J. S. PURDY, in his Report on the combined Sanitary District, Sydney,\* thus enforces the advantage of the water carriage system of sewerage:—

"The extension of the water-carriage system of sewage removal is the measure in a large city which gives the most striking evidence as being responsible for the reduction of the incidence of typhoid fever. . . . No other sanitary work gives a more immediate and better return for expenditure."

At the end of 1913, 115,601 houses were connected with the sewers.

The death-rate from typhoid is now one-sixth of what obtained in Sydney forty years ago. Per 100,000 the typhoid death-rate decreased as follows:—

1885-1890	..	..	..	..	51.3
1891-1900	..	..	..	..	21.6
1901-1910	..	..	..	..	13.2

\*New South Wales. Report of the Director General of Public Health, 1913, p. 81.



## ANKYLOSTOMIASIS.

Dr. HART\* finds that in patients admitted in Kuala Pilah Hospital the extent of ankylostomiasis according to race was per cent. for Malays, 50 ; Tamils, 30 ; and Chinese, 25.

In connection with the rate found in Tamils, it may be stated that Surgeon-Captain WILLIAMS, I.M.S. (about 1894) at a time when the presence of this parasite received but little attention found that, in 26 post-mortems at the Madras General Hospital, the percentage of ankylostome bearers was 52.

## DISINFECTION OF RAILWAY CARRIAGES.

On a route much used by tuberculous patients the following is the method of disinfection of carriages employed. The carriage concerned is removed to a siding reserved exclusively for disinfection work.

"The ventilators and windows of the car are tightly closed, the berths are taken down, the blankets, pillows, and mattresses are spread out so that the formaldehyde gas which is used may have access to the contents of the car. Three galvanized-iron pails are then placed on the floor of each car, one at each end and one in the center of the car. In each pail are placed 500 cc. of commercial formalin and 250 grams of potassium permanganate, and the doors of the cars are tightly closed. The car remains closed for about 12 hours. The windows and doors are then opened to air the car and to free it from gas, after which all carpets, upholstered seats and backs, blankets and pillows are removed from the car and placed on the platform exposed to the air and sunshine.

Dust is removed from the removable seats, backs, and carpets by means of compressed air, the force of which is so great that it removes practically every particle of dust. The carpets, seats, blankets, etc., are left on the platform until the interior of the car is cleaned. The hose furnishing compressed air is then taken into the interior of the car, and dust is removed from every part of the interior by this means. A force of car cleaners is then put to work with buckets of hot water, and by means of soap and scrubbing brushes the floor of the car is cleaned, the interior woodwork being wiped off with damp cloths.

"Drinking-water tanks and spittoons are taken out on the platform, where they are cleaned. The water tanks are scrubbed inside and out with hot water and Sapolio, rinsed with clean water, and then placed over a steam pipe and sterilized with live steam." †

It is noticed that the compressed air to remove the dust is used subsequent to disinfection by formaldehyde gas, but whilst this method of removal may have its advantages where irregular surfaces are concerned, the vacuum process would seem preferable, in that scattering of dust would not be necessary as a first step.

## WATER.

*How not to prime pumps.*

The following extract from the Report of the Bureau of Health for the Philippine Islands for 1914 [p. 10] demonstrates the value of routine bacteriological examination of water supplies (even when supposed to be fully protected) in securing the "reason why" of infection.

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\*Federated Malay States Medical Report, 1914.

†U.S. Public Health Reports, 1915. Mar. 12. Vol. 30. No. 11.  
(C219) -

"Considerable difficulty has been encountered during the past year by the presence of colon bacilli and other pathogenic organisms which were found in artesian wells that were free of these bacteria at the time that the wells were first opened. It seems likely that the infection is due to the habit of 'priming' the pumps of wells which have to be pumped. Briefly, investigation has shown that in many instances the water from the nearest carabao wallow or other contaminated source is poured into the pump and thus the infection probably takes place. At least this apparently accounts for some of the difficulties. It has been attempted to relieve this infection by constant pumping with a steam pump with the hope of actually flooding it out. This, however, has seldom been successful. Later, large quantities of potassium permanganate and in many instances calcium hypochlorite have been placed in the wells and allowed to remain there for some days and then pumping operations begun. A number of wells have been freed of infection in this way."\*

### *Sulphate of Copper Treatment of Water.*

The sudden acquirement by stored water supplies of vile odours is well recognised as ordinarily due to particular micro-organisms and algae. A water in open reservoirs once sensibly infected is liable, with recurring favourable meteorological conditions, to give trouble. The employment of sulphate of copper is an excellent remedial agent, but obviously, as usual, prevention is better than cure. In this sense the beneficial influence of general cleanliness of storage and freedom from organic matter by previous filtration is emphasized by the experience gained at the Philadelphia water works, as reported by Francis D. WEST, the officer in charge of the laboratory.\* The behaviour of organisms in the reservoirs is contrasted. The Wenty farm reservoir is lined with brick and had been employed "for many years before the water of the Delaware river was filtered." Its constant use prevented its being systematically cleaned and, as a result, it contained about 2 feet of mud. The conditions were therefore favourable for retention of contaminating algae and micro-organisms. On the other hand, the Oak Lane reservoir was lined with asphalt, presenting a contrast to the comparatively irregular surface of brick and, as it was employed after introduction of filtration, had no deposit of mud.

The Wenty reservoir contents gave rise to "numerous complaints of tastes and odours . . . the organisms chiefly present being *Conferva*, *Protococcus* and *Asterionella*."

A system of estimating the amount of contamination was then instituted by a microscopic count of units per cc. and was maintained for both reservoirs; it being determined by watching the Oak Lane reservoir to forestall any tendency to undesirable increase of organisms.

In 1910, the Wenty Farm reservoir organisms amounted to "25,000 standard units per cc. with a turbidity of 5, due entirely to microscopic growth." 0.5 of copper sulphate was then applied per million parts of the reservoir water content. This killed a few fish, but by nine days the standard units were reduced to 622. In three weeks, an increase to 17,000 occurring, 0.25 parts per million of copper sulphate was used. No fish were killed, and the standard units fell to 2,200 in four days.

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\*Engineering Record. 1914. May 9, p. 523.

In the Oak Lane reservoir it was found that the organism counts did not justify interference from 1910 to 1912, when it received one treatment against three found necessary in the case of the Wenty farm reservoir, apparently the highest count at any time being 13,000, which dropped to 100. Mr. Francis West draws the following conclusions :--

"It is evident that it is of considerable advantage to store filtered water in clean reservoirs, and that if any microscopic growth does develop about one treatment a year is sufficient. In reservoirs containing mud considerable microscopic growth takes place, necessitating careful watching and several treatments, otherwise the water will be apt to give rise to complaints of taste and odor."

The bacteria counts following the different treatments make an interesting study ; part are given in the table :--

Bacteria following copper sulphate treatment.

Oak Lane Reservoir.		Wenty Farm Reservoir.	
Date.	Bacteria per cc.	Date.	Bacteria per cc.
19/6/11	6 before	9/6/11	6 before
19	2 1 hour after	9	340 1 hour after
20	0	11	6,500 2 days "
21	4	12	2,000
23	4	14	620
24	8	16	220
29	5	20	46

"Undoubtedly, in the case of the Oak Lane reservoir, the copper sulphate killed not only the algae but also any bacteria developing from the decomposition. In the case of Wenty Farm the decomposing algae probably mix with the deposits on the bottom and saprophytic bacteria develop. No pathogenic bacteria were found. We have practically no algae in the reservoirs containing filtered water from the Schuylbill River. This is probably due to the fact that the amount of organic material in solution, as revealed by the oxygen consumed test, is less than one-half that of the Delaware."

### Food.

#### *Jail Diets.*

In this *Bulletin* [Sanitation Number, Vol. 6, No. 5, p. 270] the extent to which alteration of diet, probable release of the more feeble on account of the Delhi Durbar or improved sanitation, was responsible for the steady improvement and, finally, record mortality figure, in 1913, of 7.9 per mille in a jail population of 11,400 was discussed. The Inspector General of Jails, Madras Presidency, was inclined to place great weight upon the factor of change of diet ; the writer, whilst admitting that the principles on which McCAY's dietetic dicta are founded are correct, considered it possible that when dealing with dry grain eaters adjustment of items in the interests of economy might prove necessary ; and that no proof of increased weight with

the decreased and better adjusted diet had occurred as suggested by the Inspector General. Further evidence as to the influence of the new diet is now available, in the Report of the Administration of the Jails of the Madras Presidency for 1914. The table on the opposite page will show the facts as to the Hospital admissions and mortality rates.

The weightments as contrasted with 1912, when the diet was still unchanged, were as follows :--

Period.	Percentage of total discharged who gained weight.	Percentage of total discharged who lost weight.	Remarks.
1912 ..	68.55	18.65	Old diet
1913 ..	63.60	20.29	New diet *
1914 ..	65.46	17.85	

It is thus evident there has been a falling off, not an increase of weight, with the adjusted diet.

The Inspector-General also was of opinion that whilst dysentery "seemed to pick out the jails where the kitchens are defective and the flies are allowed more access to food than they ought to be . . . much of the improvement that has taken place might with reason be attributed to the appropriateness of the new dietary." This influence has also not been apparent in the medical history of the jails in 1914, as shown by the following figures :--

Diseases	Ratio per mille of average strength.							
	1911.		1912.		1913.		1914.	
	Admis- sions.	Deaths.	Admis- sions.	Deaths.	Admis- sions.	Deaths.	Admis- sions.	Deaths.
Dysentery	33.00	1.69	35.30	1.07	22.61	.58	39.77	.94

If then the theory that the Delhi Durbar remission of sentences of imprisonment gave release to many sickly men is correct, and the sudden improvement of the mortality rate in 1913 was due to this, it remains that the improvement in that year was but a continued result of previous sanitary efforts, and *inter alia* improvements in water supplies, and protection of latrines and kitchens against flies.

In remarking on the increase of dysentery in 1914 the Inspector-General, however, calls attention, in extenuation, to the fact that officers of the Indian Medical Service attached to the Prison Department were largely replaced, owing to military exigencies, during the year by other medical and lay officers, less experienced in jail routine and that some alterations in methods of care may have occurred.

HOSPITAL ADMISSIONS AND MORTALITY RATES.

Years.	Daily average number of prisoners.	Daily average sick.	Ratio per mille of daily sick.	Deaths.			Death-Rate.		
				From cholera.	From other causes.	Total.	From cholera.	From other causes.	Total.
1910 ..	12,997	256	19.7	2	186	188	.2	14.3	14.5
1911 ..	12,168	237	19.5	5	159	164	.4	13.1	13.5
1912 ..	11,332	218	19.2	16	115	131	1.4	10.2	11.6
1913 ..	11,400	180	15.8	8	82	90	.7	7.2	7.9
1914 ..	11,527	186	15.9	4	135	134	.3	11.5	11.8

That argument however would only be applicable to disease prevention by measures against dysentery and not to the theory of improved dietary.

On the whole, therefore, the second year's history of the trial of McCAY's dietary would show that the Inspector-General of Prisons has been somewhat unduly enthusiastic on the subject, and that his measures for prevention of disease have been the most potent factors in the improvement of health and diminution of the death-rate, and not increased resistance by alteration of the diet.

But the fact remains that a two years' trial of a diet, reduced in weight as to total staple grains, but adjusted as to its carbonaceous and proteid constituents, has certainly not proved harmful, and in so far Lt.-Col. MACNAMARA, I.M.S. has justified his advice. This being so, McCAY's contention that such adjustment should bring about marked economy should have followed. On the contrary, the diet charges per head have increased from Rs.35.09 in 1912 to Rs.39.12.8 in 1914. This is certainly due to the free use of rice\* as part of the diet, instead of trusting to adjustment of the nutritive value of the cheaper dry grains to which the mass of the people in the Madras Presidency, except on high days and holidays, are accustomed.

In the absence of economy and of any proof of better health of prisoners (notwithstanding the inevitable sensation of vacuum inflicted) this experiment of altering a diet which had not proved *per se* inimical (unless in respect to small amount of vegetables allowed) and which closely followed the habits of the majority of the people, would seem to have little purpose, beyond establishing the correctness of McCAY's views.

The variations required to secure adjustment of constituents of diet in the jails of the United Provinces, India, represent efforts in the direction of suitable utilization of various grains. In practice, the excellent health condition of the jails in that Province [see this number under Reports] suffices to show that no marked error in diet exists. The scale of diet for hard labour for males and method of variation, reproduced below, are from page 4C (a) of the Report referred to.

#### *Fixed Diets.*

In dealing with fixed diets for bodies of men, or prescribing diets for famine relief on a wage basis for vegetarians, in view of the great difference in chemical composition (especially in the amount of proteids) found in various grains, their respective digestibility and extensive wastage in preparation for cooking, it is evident that an adjustment of weights of grain in relation to other, specially proteid bearing, substances is essential. In the United Provinces, the following diet is given to all adult male prisoners sentenced to rigorous imprisonments—

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\*The Inspector-General refers to orders of Government of Madras giving rice to those certified to be accustomed to it; but no differentiation is made as to rice employed in hard labour diet.

Nitrogen—280. Carbon—5268·7.

	Cereal pulse combination.	Dal.	Vegetables.	Oil.	Chillies.	Salt.	Firewood.
Daily ..	Ch. 14	Ch. 1	Ch. 3	Ch. 4/25	No. 1	Grs. 150	Ch. 5

From 1st April to 1st November a daily ration of either one ounce of lime-juice, 70 grains "amchur," 70 grains "putwa," or 140 grains tamarind pulp should be given.

The 14 chittacks\* cereal pulse combination is invariably to be made up according to the subjoined table:—

	Combina- tion letter.	Principal.		Adjuvant.		Total.
		Grain.†	Quantity.	Grain.	Quantity.	
Highest nitrogen—282·3			Ch.		Ch.	Ch.
Lowest nitrogen—277·8	a	Wheat	11	Barley	3	14
Carbon constant.	b	Bajra	12	Pulse	2	14
	c	Makka	12	Do.	2	14
	d	Marua	11½	Do.	2½	14
	e	Wheat	11½	Do.	2½	14
	f	Juar	11	Do.	3	14
	g	Barley	11	Do.	3	14
	h	Rice	10½	Do.	3½	14

Note.—Any two of the above may be combined by taking half of each principal and half of each adjuvant: thus  $\frac{b+c}{2}$  will give bajra 6 chittacks + makka 6 chittacks + pulse 2 chittacks = 14, or  $\frac{a+g}{2}$  will give wheat 5½ chittacks + barley 7 + pulse 1½ = 14.

If rice is cheap it may be used in the form of bread or boiled as "khichri"; in either case the combination should be  $\frac{a+h}{2}$  that is, rice 5½ + wheat 5½ + barley 1½ + pulse 1½ = 14.

When the rice is given as "khichri," the wheat and barley are to be given as bread.

\*Chittack = 2·05 ounces avoirdupois.

Amchur = sundried mangoes.

Khichri = rice with dal flavouring and colouring material, oil or clarified butter boiled together till cooked and dry.

†Makka = Maize (*Zea mays*).

Bajra = *Penicillaria spicata*.

Marua = *Eleusine coracana*.

Juar = *Soorghum vulgare*.

*Diet in Beriberi.*

Beriberi, in its literal sense, is merely applicable to a symptom of a diseased condition in the human subject, which causes a sheeplike waddle in walking. When certain other classical symptoms of derangement of nerve and cardiac control accompany this gait, the affection is popularly known as beriberi. That this disease is rightly classed as a "deficiency disease," there must in the present day be few dissentients. But the diagnosis of beriberi rests upon no single pathognomonic sign; the disease is brought within the recognized definition of beriberi by consideration of a group of symptoms. Certain of these are common to mere derangements, which may be classed as peripheral or poly-"neuritis." If the evidence of epidemics of beriberi be examined, it does not follow that the vitamine theory is fully applicable. This may mean that the history as to diet is defective, that the diagnosis was incorrect, or that observers are dealing with diseases having a largely similar train of symptoms but a different causation. Thus, it is possible to connect beriberi with sites, and to discount the vitamine theory, and there are members of the profession who would contend that the disease is insect borne. As to the food deficiency theory, attention has been chiefly fixed on the connection of the disease with rice; whilst there are suggestions as to changed conditions of substance such as might attend tinned foods. The Japanese apparently met the difficulty in their Navy by increase of nitrogenous elements in the diet prescribed, but other changes doubtless occurred synchronously as, for example, in the general environment of the men. Rice as a grain defective in proteids especially lays itself open to suspicion from this point of view. Then as to this article of diet (before the deprivation of the subpericarpal layer was invested with importance) milling was thought in some way to be related to its phosphatic contents. That it should be possible to cure beriberi by an extract of the pericarpal layer would go a long way towards proof of the evil influence of polishing rice, and would bring attention to the question of how far this layer may be rendered impotent under the influence of moulds, as well as by removal in milling. Whilst, therefore, there is a general agreement as to beriberi being placed under deficiency diseases, there is obviously ample room for investigations that will render the knowledge so far gained more precise.

In the meantime, members of the profession in the tropics would greatly accelerate conclusions if it was recognized that, in all probability, confusion of opinion results from its not being more usually conceded that there may be forms of epidemic peripheral neuritis, which have yet to be differentiated from the classical beriberi of food deficiency origin. The view that differentiation may be required is freely conceded by FRASER and STANTON who, as successors to BRADDON, have done so much to establish the food deficiency theory. But such recognition demands that if, for example, the observer would support the insect borne theory of epidemic beriberi, he shall not neglect to give, in detail, not only the clinical symptoms but the items and amounts of diet used, its soundness and freedom from moulds, and the mode of cooking employed, as well as the grounds for believing that insects are the bearers. In this way, much important and trustworthy information might shortly be gathered.



On the opposite, to assume, without further enquiry, that but one form of epidemic peripheral neuritis known as beriberi exists, and that to find a flaw in diet suffices to account for its existence in a community, must delay progress.

These general remarks are made with reference to the epidemics which have repeatedly occurred amongst British troops stationed at Lebong. The subject is thus discussed in the Section devoted to the European Army, in the Report of the Sanitary Commissioner with the Government of India 1913—[p. 17 *et seq.*] :—

“ In 1911 cases recorded as peripheral neuritis at Lebong were suspected of being beriberi and in the summer of 1911 the officer in charge of the Presidency Brigade Laboratory was sent to inquire into them. He found several cases with oedema, alterations of sensation of the feet and legs, and cardiac symptoms. He stated that the incidence of the disease was greatest in the lowest and dampest barrack rooms. He found that the flour and rice were mouldy from long storage in a damp room and that the mutton was of poor quality. He noted that the privates and lance-corporals (who probably supplemented their food less than the higher ranks) were exclusively affected. Of 14 cases then investigated seven were teetotalers, most of the others only drank a pint of beer a day and the beer contained no arsenic. In view of subsequent events there is, however, little doubt that they were genuine cases of beriberi of varying severity.

“ In the autumn of 1913, the Officer Commanding the Station Hospital, Lebong, suspected that many of the cases that were being admitted to hospital or treated in barracks as peripheral neuritis were in reality beriberi, and asked for a committee to inquire into it. Majors E. D. W. Greig, I.M.S., F. Harvey, and J. C. Kennedy, R.A.M.C., and Captain C. J. Davys, I.M.S., were appointed and in their report state that “ the patients shown to them were suffering from beriberi ” and there was “ no good reason to attribute the patients’ condition to any other cause.” *They considered that this disease had existed in the garrison at Lebong for some years but that the cases were of a mild type and difficult to recognise.* [Italics not in original.]

“ Their report went on to suggest that the food of the troops at Lebong was wanting to some extent in its natural activating principles and so led to defective metabolism and a lowered state of nutrition. It was noted that the disease was confined to the troops at Lebong, and was not present among the civil population in the neighbourhood. The rations supplied to the troops, especially the meat and vegetables, were described as of poor quality, the diet monotonous, and the cooking inferior.

“ In the same year another series of cases of “ peripheral neuritis ” occurred at Barrackpore. There were 19 admissions for this disease—11 of which originated in that station. Of these only one was severe and it is reported that “ the remainder were of a milder type than those that had occurred in the two preceding years. Of these 11 cases, 8 belonged to the detachment of the 2nd King’s Own Regiment, 2 to the 7th Battery, Royal Field Artillery, and one to the Supply and Transport Corps. Six of the King’s Own Regiment admitted, had occupied the same barrack room between the 14th March and 29th April, 1913, and this room had been occupied between the 23rd February and 10th March by two men convalescent from the same disease contracted in the preceding year. Shortly afterwards this room was temporarily occupied by men of the 2nd Black Watch from Calcutta, among whom two cases occurred; further, one of the two occupied the bed cot which had been used by one of the invalids and the other a cot placed in the verandah adjoining and very near by. The two cases already mentioned in the 7th Battery, Royal Field Artillery, were preceded by 6 cases in the same unit in 1912 and of this total of 8 cases 6 are noticed as having occurred in men occupying a particular barrack room at one time or another. The Medical Officer states : “ These facts appear to be more than a coincidence and lead to the opinion that beriberi is not a food disease, but due to infection or communicated by insects.” No reference is made as to the rations of the men. -

"To revert to Lebong, the view that the cases returned as peripheral neuritis at that station during the last few years were genuine beriberi may be accepted. It can hardly be accepted as proven, however, that the rations issued at Lebong were specially deficient in vitamins, and in view of the Barrackpore cases it is possible that some other factors may have been in operation. In Darjeeling the disease was limited to Lebong, and the troops at Jalapahar a mile or two away never suffered from it; there was no apparent difference between the rations the Lebong garrison received and those issued to other soldiers throughout India including Jalapahar. The culinary arrangements at Lebong as described by the Committee were not satisfactory but this hardly explains the successive outbreaks of the disease that have occurred in different infantry units stationed there in recent years.

"It appears to be premature to arrive at any definite opinion regarding these outbreaks. Should cases occur again in 1914 further inquiries will be instituted."\*

In this connection the Public Health Report for the Zanzibar Protectorate for 1913, by Major SKELTON may be referred to. He shows that in a jail where a part of the diet was rice, but entirely of the unpolished variety, 79 beriberi cases occurred between 1907 and 1913.

"Previous to August, 1912, the prisoners occupied an old jail which was bug (*Cimex rotundatus*) infested in the highest degree. In November, 1910, the Principal Medical Officer, gave orders that the sleeping mats of all prisoners and troops should be boiled once a week. He demonstrated at that time that the prison cell walls harboured bugs in any quantity; that white washing, unless the walls were previously scraped clean and afterwards cemented, was useless; he demanded that the cell walls should be cemented, and though this was done in the case of two cells, it was found to be too expensive to carry out the work for the whole jail. Following the cleansing methods adopted by Mr. McDonald, the incidence of beriberi fell in 1911, in the case of prisoners by nearly 40 per cent. [from 13 to 8], while in the case of the troops no case at all occurred in 1912 or 1913 [7 in 1911]."

Major SKELTON proposed to make experiments on bug transmission of beriberi in 1914-15.

In the Shanghai jail, where beriberi has persisted for a long period, the following opinions have been given by Dr. Noel DAVIS (a)† and Dr. Arthur STANLEY (b)‡ respectively, on the subject:—

(a) "In Shanghai, in the Municipal Jail for Chinese, in spite of the use of adequate diet, including beans and pork as well as partly milled rice beriberi occurs, and it has been observed to do so and to increase *pari passu* with infestation of the jail with parasites—notably bugs—and to decline after thorough disinfection had been carried out. The indication is an infection transmitted by these or other parasites."

(b) "The incidence of beriberi among the Municipal prisoners has diminished. The cause of this disease remains under close observation, though up to the present wrapt in obscurity. The evidence preponderates in favour of the disease being an infective one having no direct relation to food but infective through body vermin. . . . At the gaol there were 2 cases as against 27, 34, 134, 0, 0, 2, 2, 2, 1, 5, 78, 16, 7, and 2 in succeeding years since 1899."

\*Since the above was in type the writer is in receipt of the September Number (No. 3, Vol. 25) of the *Journal of the Royal Army Medical Corps*. In this is a very careful report by Major KENNEDY, who was placed on special duty at Lebong to carry out the recommendations of the Committee. The Report will be noticed in the next issue of the Sanitation Number of this *Bulletin*.

†Transactions of the XIIIth International Congress of Medicine, London, 1913. Section 21. Pt. 2. p. 118.

‡Shanghai Municipal Council, Health Department Annual Report, 1913.





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**RICE MEAL FEEDING EXPERIMENT.**

Nos. 1, 2 and 3 fed rice meal, dried blood and mangels.  
No. 4 fed on wheat shorts, chop and dried blood.



It is evident that in the cases of Lebong, Zanzibar and Shanghai, were the symptoms and *details* of diet placed before the reader, there would have accumulated matter aiding materially the evaluation of opinion as to the dual theory of causation of the beriberi.

The domestic fowl has been largely the subject of experimental production of a disease resembling beriberi. The pig however offers perhaps conditions which are more analogous to those found in human beings, at least in so far as it favours a very mixed diet. Experiments have recently been conducted at the Agassiz Experimental farm, British Columbia, in the Dominion of Canada Department of Agriculture, which should prove of much interest on the subject of vitamins generally, and of the position of rice in diet in relation to disease in particular. The general conduct of experimental feeding is in the hands of Mr. MOORE, but in the course of investigations Dr. Seymour HADWEN, D.V.Sc., in charge of the Veterinary Research Laboratory, was requested to undertake the pathological study of a disease in pigs produced by the feeding of rice meal. The accompanying reproduced photographs show the marked contrast between rice meal and wheat-fed animals. In his Report on the subject,\* Dr. Seymour HADWEN states that on examining the animals he was struck "with the resemblance of the symptoms to those described for beriberi in human beings and all the evidence which has since come out strengthens this theory."

It is as yet impossible to arrive at any decision on the subject in the absence of results of chemical analysis of the rice-meal which was utilized. This is being undertaken. In the meantime, the writer has ascertained that the meal employed was of Japanese or Chinese origin; and unless it be ultimately shown that these varieties differ widely from the usual composition of the rice-meal of commerce, the experiment must possess the peculiar interest of the foods including, in a proportion unusual in a diet, the sub-pericarpal layers, the absence of which has been regarded as the chief cause of food deficiency in respect to polished rice, and an extract of which it has been sought to use for curative purposes.

Where there are opportunities of carrying out similar experiments, the following analysis of "rice meal," as ordinarily understood commercially, reported by Dr. F. J. WARTH and Mr. D. B. DARABSETT,† may be of utility to those undertaking them:—

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Bhussi or meal from cones and polishers.

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	Good.	Medium.	Poor.
Moisture .. ..	11·07	11·09	10·18
Oil .. ..	10·67	6·04	2·71
Proteid .. ..	10·40	8·45	6·89
Carbo-hydrate ..	44·12	41·93	39·16
Fibre .. ..	9·54	17·60	25·76
Ash .. ..	14·20	14·89	15·30

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\*Dept. of Agriculture, Division of Animal Husbandry, Sessional paper, No. 16, and Report of Veterinary Director General, Canada, for the year 1914.

†Bulletin No. 10 of 1913, Department of Agriculture, Burma.

Mineral constituents of by-products [of milling rice grain ("paddy")]  
per 100 parts.

Constituents.	Meal from polishers.	Meal for shipment.	Mill dust.	Husk.
Sand (Si O <sub>2</sub> ) ..	·970	1·402	11·50	17·180
Lime (CaO) ..	·040	·061	·068	
Magnesia (Mg O) ..	·175	·990	·499	
Phosphoric acid (P <sub>2</sub> O <sub>5</sub> ) ..	2·816	3·858	1·092	·041
Potash ..	—	1·464	—	—
Nitrogen (N) ..	1·640	1·880	1·127	·027

The contrast, as shown by the reproduced photographs, between the rice-meal fed and the wheat-fed animal is certainly very marked.

*Diet in Pellagra.*

In Vol. 4, No. 8 [Sanitation Number] of this *Bulletin* [pp. 444-445] reference was made to the views of Dr. Hugh S. STANNUS on the subject of pellagra as it occurred in the Central Prison of Zomba, Nyasaland. The opinion formed by the writer was that, in the correct spirit of enquiry, Dr. STANNUS was endeavouring to balance the pros and cons of an "unsupplemented rice" diet in causation, especially with reference to damaged grain and the Simuliidae theories. The writer invited particular attention to the radically incorrect diet in the Zomba prison, irrespective of condition of the rice employed. Dr. STANNUS, in a letter to the Director, is now able to give the interesting statement that, on his recommendation, during 1914 (evidently previous to receipt of the writer's remarks) the diet of the prisoners was changed, and that he believes (for he is now absent on field service) that "at most one or two cases of pellagra appeared after a more generous and varied diet [nature of change not stated] had been instituted in the prison, whether a direct result or not I cannot say." As to the opinion of Dr. STANNUS that pellagra exists in Zanzibar and that Simuliidae are also found, he now states that his assertion as to the presence of the Diptera was in trust of other medical officers' statements.

In reviewing the facts brought together by Dr. STANNUS, the writer was not disposed to place great value upon the white line at the angles of the mouth and the condition of the oral cavity held by Dr. STANNUS to be necessarily characteristic of pellagra, as he had found these symptoms to be not infrequent sequels in natives of India, "partaking of salt fish on the verge of decomposition"; and he pointed to the fact that the diet used in the Zomba jail permitted "an unstated amount of fish or meat once a fortnight." Dr. STANNUS fails to see the analogy, and urges that the fish used in Zomba is not salted but sun dried. This being so, the writer suggests it would be more likely to fulfil the condition at intervals of being "on the verge of decomposition," to which accidental condition alone and not to the presence of salt, in the case of Indians, he would ascribe the evil influence on the oral cavity.

Dr. STANNUS would now further strengthen his opinion as to characteristic mouth symptoms as follows:—"Note should also be made that the condition of the corners of the mouth is often reproduced at the free margin of the prepuce. Does this occur in Indian eaters of salt fish?" The writer regrets he cannot give information as to the state of the prepuce in such cases, but he believes there is no reason to think any evil result occurs from eating *sound* salted fish. Dr. STANNUS would follow his opinion as to the diagnostic value of the "white line" in pellagra, by suggesting that perhaps pellagra exists in India. This may well be so, but the writer is not aware of cases being definitely so recognized.

Dr. F. M. SANDWICH, in a paper recently read before the Society of Tropical Medicine and Hygiene,\* after a review of the various theories extant as to pellagra, definitely favours this disease being caused by absence of "vitamines," and therefore would class it with "deficiency" diseases. The connection with maize he, therefore, regards as purely accidental, as in beriberi with rice. Nevertheless, he thinks it desirable it should be ascertained what, if any, connection unsound maize may have with aggravating conditions favouring the disease. With the aid of Dr. Hugh MACLEAN, Chemical Pathologist, Jenner Laboratory, St. Thomas's Hospital, experiments to this end have been inaugurated by Dr. SANDWICH.

A series of experiments with guinea-pigs was necessary, as a first step, to show the minimum of green food (cabbage) and sound maize necessary to sustain life. This having been settled, it was possible to substitute "bad maize" for the good. It has been impossible to carry on these experiments fully "on account of war difficulties"; but Dr. SANDWICH found that, so far as feeding on "good" and "bad" maize for a whole month was concerned, "there was absolutely no difference between the good and bad maize," and adds: "This throws out of court all the short experiments so prevalent in the literature of pellagra."

#### *Milk from Tuberculous Cows.*

The South African Union Government Tuberculosis Commission of 1912† have advised attention to the necessity for special measures against bovine tuberculosis. They form the opinion that the disease was due, at an early date, to importation especially of stud animals. It, however, did not attract official attention till about 1904, when the Colonial Veterinary Department investigated the subject. Mr. William ROBERTSON (an officer of that Department) as a result of testing certain herds with tuberculin, formed the opinion that, in the Cape Division, about 60 per cent. of the cattle were infected. By 1906, a "weak Animal Disease Act" was passed, which authorized the use of the tuberculin test and destruction of infected animals, on compensation not exceeding £15 being given. Under this authority, 16,796 animals were tested in the Divisions of the Cape, Malmesbury, Stellenbosch, Paarl, and Caledon, with the result that 2.55 per cent. were "reactors." Under these circumstances, the Commissioners have

\*Transactions of the Society of Tropical Medicine and Hygiene, 1915, Oct. Vol. 9. No. 1.

†Union of S. Africa. Report of the Tuberculosis Commission, 1914, p. 217.



no hesitation in advising amendment of the "weak" Act; through which, as shown by them, the proverbial "cart and horse" could have met little obstruction *en route*. The italics in this quotation are in the original:—

"(d) In the event of any animal being *found to be suffering from tuberculosis*, or to have reacted to the tuberculin test, such animal *may, upon the instructions of the Minister*, be destroyed . . . or the Minister may order the infected animal to be branded with a T and Crown and numbered, and authorise a permit to be issued to the owner to keep the animal under such conditions as the Minister may see fit to impose, with a view to slaughtering it within a period fixed by him, or till such time as the permit is withdrawn."

By a further clause (f), if the conditions imposed are infringed, only the Minister (not even the Principal Veterinary Surgeon) can withdraw the permit or order the animal to be destroyed. Furthermore, it is provided by clause (j) that:

"No person shall use, sell, barter, or give, or permit to be used, sold, bartered, or given to any person the milk of cows suffering from tuberculosis of the udder unless the milk has been boiled."

From this, it is evident that a person is authorised to sell, barter, or give the milk, infected and unboiled, from a tuberculous cow, provided that the udder be not affected, and presumably he would not be debarred from making and selling butter, cheese and other products made from the unboiled milk, even though it came from a tuberculous udder.

On the subject of sale of milk from infected cows, the Commission express emphatic disapproval, even with the proviso that it be "issued boiled." They recall the facts recorded by the "Royal Commission on human and animal Tuberculosis" as to considerable chances of animals suffering from tuberculosis being apparently healthy and, without obvious infection of the udder, passing tubercle infected milk, and that infected intestinal and uterine discharges may, in the process of milking, reach the milk. In 1903, the Chief of the Bureau of Animal Industry of the United States, in giving a similar opinion, stated that cows may secrete a virulent milk and yet that they are tuberculous is, during life, impossible of detection without the tuberculin test. They finally support their opinion as to necessity of withdrawal of the permission clause to sell boiled tubercle infected milk as follows:—

"In saying this, we may add that while we hold the view that all cows' milk should be either sterilized or boiled before consumption, as a general measure of precaution, yet we cannot believe in the wisdom of consuming milk infected with the organisms of a disease peculiarly fatal to human beings, on the mere assumption that a safeguard most difficult of control, has been properly carried out."

### *Skimmed Milk.*

In the Philippines, owing to poor quality of fresh milk supplied, canned milk was imported. Much of this was found to be skimmed. In the interests of infantile life legislation has provided for taxation of skimmed milk "in whatever form from which the cream has been removed entirely or in part," of 10 cents for each 2·2 pounds.

*Milk Purity.*

The following are some of the rules now in force in Chicago\* :—

“All milk not falling into the class of inspected milk must be pasteurized. To be classed as ‘inspected’ milk must be produced on farms scoring not less than 70 per cent. and not contain more than 100,000 bacteria per cc. from October 1st to May 1st, nor more than 150,000 bacteria from May 2nd to September 30th. Inspected cream may not contain more than 150,000 bacteria per c.c. from October 1st to May 1st, nor more than 300,000 bacteria from May 2nd to September 30th. . . . .

“In all continuous pasteurizers the milk and cream must be heated to a temperature to kill 99 per cent. of the bacteria and all pathogenic bacteria in the raw product. The temperature must be not less than 140° F. for 20 minutes or not less than 155° F. for 5 minutes.

“Pasteurized milk must be so labelled, with the date.

“The milk standard requires that milk shall contain not less than 12 per cent. total solids, nor less than 3 per cent. butter fat, nor more than 88 per cent. watery fluid. The standard for cream is fixed at not less than 15 per cent. butter fat. Persons offering milk below standard for sale are subject to a fine.

“Skimmed milk must be shipped in cans painted red and labelled ‘Skimmed milk.’

“Milk and cream transported into the city or delivered from point to point must not be at a temperature higher than 55° F.

“Milk can not be sent from dairies or sold from milk depots and stores where a communicable disease exists in an employee or in his family.

“Adulteration and addition of colouring or preservative agents are forbidden.

“Cows must not be fed on slops or refuse of breweries and vinegar factories; nor may milk be sold from cows 15 days before to one week after parturition.”

Senior Surgeon J. C. PERRY, who quotes the above rules, adds observations as to method of administration from which the following extract is given :—

“Frequent inspections are made of pasteurizing plants while in operation, and the temperature of the milk in different stages of the process and the length of time held are carefully studied, with the feeding apparatus adjusted so that the milk is properly pasteurized. Examination is made as to technique and cleanliness of equipment and insanitary conditions or improper handling of the milk are corrected. By taking samples for bacteriological examination at different stages of the process, the efficiency of the pasteurizer is determined. Before a licence is granted to new plants, three specially trained inspectors examine and regulate them. Automatic temperature recording devices must be attached to each pasteurizer.

“A special card is used for scoring pasteurizing plants, which takes into consideration three important factors: Location and construction of room, including light, ventilation, floors and walls, where pasteurizing apparatus is installed; the equipment, integral parts of the plant itself, and the methods of handling. The last is given as much weight as the other two combined. This, in my opinion, is correct and should constitute the critical score as to whether a plant conforms to requirements or not.”

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\*U.S. Public Health Reports, 1915. Aug. 27. Vol. 30. No. 35, p. 2537.

*Tuberculous Meat.*

The Royal Commission on Human and Animal Tuberculosis\* advises that animals suffering from tuberculosis might be used for human food under the following condition :—

- |  |   |  |
|--|---|--|
| <p>“(a) When the lesions are confined to the lungs and the thoracic lymphatic glands.</p> <p>“(b) When the lesions are confined to the liver.</p> <p>“(c) When the lesions are confined to the pharyngeal lymphatic glands.</p> <p>“(d) When the lesions are confined to any combination of the foregoing but are collectively small in extent.</p>                  | } | <p>The carcase, if otherwise healthy, shall not be condemned, but every part of it containing tuberculous lesions shall be seized.</p> |
| <p>“(a) When there is miliary tuberculosis of both lungs.</p> <p>“(b) When tuberculous lesions are present on the pleura and peritoneum.</p> <p>“(c) When tuberculous lesions are present in the muscular system, or in the lymphatic glands embedded in or between the muscles.</p> <p>“(d) When tuberculous lesions exist in any part of an emaciated carcase.</p> | } | <p>The entire carcase and all the organs may be seized.”</p>   |

The South African Union Tuberculosis Commission, whilst not in agreement with the practice thus advised, express themselves as not “inclined to specifically condemn it,” but they would guard sale of meat under such conditions by the following desirable proviso :—

“They are, however, unanimous in the opinion that such meat should not be sold to the public on the same footing as meat from a perfectly healthy animal. They consider that the purchaser has the right to be informed of the origin of the meat he is buying, and they therefore recommend that all such should be branded in such a manner as to clearly indicate its origin to the purchaser.”

\*Union of South Africa. Report of the Tuberculosis Commission, 1914.

## SANITARY ORGANISATION.

## EDUCATION IN HYGIENE OF THE FUTURE OFFICIAL.

British Administrators of the period of Crecy awarded to the sanitary experts with their forces the rank and pay of the drummer. This was in accord with the popular estimate of the surgeon and of the science of disease prevention of the period. Perhaps it found its correct level ; yet, as in the present day, there was possibly a lingering suspicion in those practising preventive medicine that administrators, by reason of their failure to appreciate the bearing of its doctrines upon the political economy of nations, hampered social advance. Sir Ronald Ross in his Chadwick Lectures\* had no hesitation in arriving at the opinion that not until administrators were required to undergo a course of hygiene in their youth would its public importance be apparent to them.

*The Evolution of a Public Health Service.*

In a Sanitation Number of this *Bulletin* [Vol. 5, No. 8, p. 470] there was suggested a type sanitary organization in the tropics. Confirmation of this type being closely in accordance with the general trend of the opinions of sanitarians is forthcoming, in the description of the sanitary organization of New South Wales. Here it is found that, instead of the administration of sanitary matters being relegated to a mere branch of an office meant to deal primarily with other subjects, New South Wales has already attained the ambition of possessing a Minister of Public Health.

Under this Minister "the permanent head of the organization is the Director-General of Public Health (Dr. Robt. T. Paton) who has a staff of Medical Officers and Inspectors and also holds the position of President of the Board of Health. As far as the Metropolis is concerned, the Metropolitan Medical Officer of Health, appointed by the Government, is an officer attached to the office of the Director-General of Public Health. . . . By making the City Health Officer also an officer of the Board of Health, it is found that as far as medical supervision is concerned, it is possible to have some uniformity of control and there is an avoidance of any friction which might occur if the City Health Officer were a separate officer, working quite apart from the Board."†

The tendency to link up allied Departments, so as to form a homogeneous administrative unit, is also distinctly shown in the New South Wales Public Health administration. Arrangements exist for the close intercommunication and allied action of the Veterinary and Agricultural Departments. In the care of the latter is the control of the butter and cheese factories of the State and of the former, the Meat Export Depot of the Commonwealth. Both research and the forwarding of the interests of routine Applied Hygiene are served by the Government Bureau of Microbiology, which includes an animal vaccine farm. Qualified Sanitary Inspectors are employed in both urban and rural areas. In the endeavour to educate the lay public, a Sanitary Mission of the Public Health Service has been opened in Sydney.

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\*Journal of State Medicine, 1915. Apr. Vol. 23. No. 4, pp. 97-106.

.. †Report of the Director-General of Public Health, New South Wales, for the year 1913.

As regards organization, whether it be in the care of the born or unborn members of the future generation, in the rectification of errors in town planning, or in the prevention of disease, the Report of the Director General shows that in sanitation New South Wales is living up to the resolve "Advance Australia."

Dr. Robert T. PATON in recording the fact that he succeeds Dr. ASHBURTON THOMPSON, does not fail to invite attention to the strenuous pioneer work of that officer during 28 years, which has placed the Public Health Service in its present position.

#### EDUCATION OF THE PUBLIC IN HYGIENE.

It is a foregone conclusion that if sanitation were correctly appreciated the average inhabitants of the tropics would demand better hygienic condition of their environments, would pay the necessary taxes for improvements with a good grace, and might practice self abnegation in the interests of their fellow men. But the problem is not so simple when it becomes necessary to say exactly how this correct appreciation is to be secured.

The officers of Educational Departments, however, usually have no doubt on the subject. The correct course to them is obvious: Introduce compulsory education, teach the child of the future generation the three Rs, and he will acquire an appreciation of hygiene; go beyond this limit in educational acquirements, and there will be produced the Local Authorities who will vote cheerfully for the necessary taxes, and will delay the erection of ornate offices in favour of improved public conservancy.

In discussing details of such a proposition, there must always exist a general agreement with the plain fact that an educated man (even if his knowledge is limited to the three Rs) is more likely to appreciate and act upon sanitary dictates than an unsophisticated inhabitant of the "bush." But, this being admitted, practical experience shows that abstract education is not a panacea, and that to secure its benefit there can be no rule of thumb procedure adapted to all people. Hence the following opinions expressed in papers on the subject at the last Congress\* at Saigon (1913) are of interest.

Dr. E. S. TYAU† advocated "School Instruction as the leading factor," the required instruction in elementary principles of hygiene being combined with illustrative talks on school ventilation, fresh air, cleanliness, diet, infection, oral hygiene, wholesome food, personal methods of "eating, sleeping and exercising and such essentials of hygiene." Next, speaking presumably only of Christian communities, he considered the churches afford an excellent medium for demonstration of health principles—the object being to show that "disease is not a necessary evil sent by a destroying God." He pointed to the necessity for the recognition of the influence of the women of the community when "organized especially for medical social service" and finally pointed to "the potent agency of the Press." He gave an instance of the utilization of this factor in the case of an American

\* Far East. Assoc. Trop. Med. C.R. Trois Congrès Biennal, Saigon (1913), 1914.

† A Plea for a Campaign of Public Health Education in China.—*China Medical Jl.* 1915. July. Vol. 29. No. 4.

Society "which appoints certain of its members to write a communication to the county papers once a week." He believes that such a campaign would be aided by "baby saving shows and similar exhibits."

Dr. Arthur STANLEY\* laid emphasis upon the necessity for effort by correctly organised public bodies, aided by trained superior and subordinate staffs. He would not wait for the results of demonstration "by flags, feasts and photographs" to expedite sanitary reforms, but, having secured a public body supported by suitable laws, would proceed to bring about by due tact disease prevention. He believes that "however desirable it may be to let all efforts for the amelioration of public health be voluntary on the part of the public, such would be utopian under present conditions in the homeland, and would be still more impracticable in China."

So far as education of the public is concerned, he would advise the drawing up of notices in simple language, and the giving of "frequent popular lectures and demonstrations, at the branch offices. . . . The main thing in China would appear to be to prevent waste of effort, and to direct energy into the right channels on those measures which mean most."

Dr. W. W. PETER, whilst recognising the importance of education of the people that they may understand the object of public sanitary measures, considers essential the recognition of public health officers as the exponents of sanitary requirements, and also places his faith in correct organization. He stated †:—

"Most of these preventable diseases are now known to be due to social conditions beyond the control of the individual. This means that the remedy is not alone the treatment of the patient by the individual doctor, but rather the broad treatment of the entire social organism by all the constructive forces available, the medical profession included among the foremost."

Dr. WU LIEN TEH‡ in introducing his subject pays a tribute to curative medicine. He considers that "no branch of Medical Missionary work appeals more to Chinese than the fine surgical skill shown by Missionary Surgeons throughout the hospitals of China. With the establishment of more modern hospitals and the arrival of keen surgeons this reputation will be enhanced, and will lead to a quicker appreciation of western medicine by the people." He then refers to writings "handed down from the Chow dynasty" showing that the Chinese possessed a "Sanitary conscience" which though now latent is capable of being awakened. To this end he would demand more attention to hygiene as part of medical teaching, whilst he would encourage the publication of popular articles in the press. Finally, he would advise that "teacher, magistrate, police officer, merchant, mother of the home (if she can read), and every schoolboy and girl should possess" sanitary knowledge, of which he furnishes an outline under nine heads. His organization would embrace a Central Medical Council consisting of a representative member from each medical school, in which would be given a place for an Education

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\*"How to initiate Public Health Work in Chinese Cities."—*China Medical J.* 1915. July. Vol. 29. No. 4.

†"Public Health Education in China."—*Ibid.*

‡"Awaking the Sanitary Conscience of China."—*Ibid.*

officer ; the establishment of " Sanitary Boards," systematic teaching of elementary hygiene in schools, the establishment of " Social Leagues" for " public health propagation " with a Central Public Health Institute in the capital of the country. His ideal is that " at this Institute all information and help relating to hygiene and sanitation could be obtained if required, and the records for the whole country kept," *plus* all up-to-date laboratories dealing with bacteriology, vaccines, and sera. He believes that " such an Institute, although costing a considerable sum at the beginning would, if properly managed, yield enough after a term of years to pay all expenses."

Dr. Wu Lien Teh (an officer who dealt largely with the North Manchurian epidemic of plague) concludes his paper by showing that his representations to the Central Government of China have already secured " the enforcement of certain hygienic regulations on all government railways," and the approval of his plan " for the introduction of hygiene primers into schools."

#### THE FORMATION OF THE " SANITARY CONSCIENCE " IN THE TROPICS.

In the preceding notes, the authors referred to exhibit considerable faith in teaching hygiene in Elementary Schools. So long as this is not coupled with the belief that by this means it should be possible to relax public sanitary efforts and the execution of sanitary works pending the advent of a public " sanitary conscience," there can be no doubt of its utility. But in schools of insanitary construction, situated in villages innocent of suitable water or conservancy arrangements, it must be of remarkably little use to tell a child how matters in these respects should be. Equally so is it of little utility to inform a public which has never seen a town under reasonably good sanitary condition, that such and such steps are requisite, and expect therefrom the growth of public opinion ; if by that is meant, not the opinion of exceptional educated individuals possessed of official or other influence, but the mass of the people. Some may not readily grant a distinction need exist ; they would educate the mass of the people and believe that public opinion in favour of sanitation must follow. This is not devoid of truth, if time be not considered ; but if public sanitary improvements are to be held up till this opinion is formed the millenium must be awaited.

Where then is the compromise between the two views to be found ? The writer conceives it must be recognized that present-day elementary education afforded to the masses cannot in practice proceed beyond the stage of preparing the mind for impressions, and that these should be superadded by methods that leave the least possible need for the exercise of imagination or reasoning powers. An approach to such views is exhibited by the authors above alluded to, in that they place their faith not solely in pamphlets but in lantern slides and exhibitions. In the two latter details there is the closest approach to the true form of education of the masses that can be made, namely, by practical demonstration of results of completed sanitary works.

To this end the best aid a school can afford hygiene is not by taxing the imagination by solely cramming with theories, *but by itself being a practical illustration of correct building, ventilation, conservancy and water supply.* Practical attention also to cleanliness, care of eyesight

and teeth and physical culture are great factors in securing education in personal hygiene.

In attempting the elementary education of the masses, it is fatal to neglect the education of their women folk. So long as the women are not hygienists, any approach to disease prevention in the home, where the influence of general education should naturally make itself felt, can be but of a halting nature. This is peculiarly the case in India, where caste (in so far as it is wrongly interpreted by custom) in the present day may be defied by the educated man, but where he is practically helpless within his own household.

But elementary school education, whilst representing possibilities for the next generation if conveyed to pupils with due care as to practical demonstration, will not materially aid present day public advance. Here again education by demonstration is the only rational method available. The method is not complex in its educative influence; it appeals largely subconsciously to the powerful instinct of self-interest, as represented by increased chances of convenience and improved health; and it has the advantage of appealing not only to the uneducated masses but to "men of light and leading."

Education by demonstration is feasible in the hands of public authorities by their executing sanitary works against malaria, especially when combined with agricultural improvements, public water supply and conservancy. Such matters must be carried with extraordinary want of tact if they offend the most conservative of people; whilst it need not be said that all experience goes to show that if works are so designed as to accomplish, in practice, their sanitary aims, no people is so devoid of brains as not to appreciate the ends secured in increased health and comfort.

In short, whilst domestic hygiene must wait to a considerable extent upon elementary education and economic advance of a people, Applied Hygiene by means of public improvements *by demonstration is the best aid to rapid education in domestic hygiene and the ensuring of economic advance*. An ounce of practice being worth a ton of theory the following extracts from published official Reports by the writer may afford illustrations, in practice, of education of the masses by demonstration, and of the hopelessness of forming a public "sanitary conscience" in the absence of such demonstration amongst a people possessed of academic education of a high order.

An instance had occurred where a street had been reformed and drained in a rural town, at the expense of a District Board. At the same time a private individual, as a matter of philanthropy, had been good enough to undertake the drainage of cattle sheds and courtyards in the private premises. The mental effect on the inhabitants is thus described\* :—

"Where the people were well off they were fired by pride not to accept this charity, and carried out the work to our satisfaction by their own money. From being an evil smelling narrow tortuous street Berhumals Street, as it was subsequently called in grateful acknowledgement of the generous donor, became the street where the well-to-do now prefer to have their dwellings. Not only did Mr. Berhumal's action do good to Nandyal, but I believe to other villages as well, as villagers used to make pilgrimages to see the improvements in the private premises, and became convinced that if they must live side by side with cattle it can be effected in a fairly cleanly method."

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\* Madras, G.O. No. 653 M. Dated June 2nd, 1902.



Indeed, in a distant village (Buswaripett) the inhabitants volunteered to pay half the cost of public drainage, as a result of the demonstration of increased cleanliness and convenience they had witnessed.

In the second example, a Municipality had failed to enforce its powers as to private night-soil conservancy, and notwithstanding that probably not a single house in the area concerned did not contain heads of families highly educated in the Western sense, there certainly existed no "sanitary conscience."

"There is a tank known as the ———, the edges of which are inhabited by highly respectable persons of a high caste of natives. In spite of protestations by the Municipality, their ordinary procedure is to defaecate all round the tank immediately in front of their houses on the high road, in such proximity as not only to form a nuisance by reason of sight and smell but to be absolutely indecent, having regard to the fact that the houses contain mixed sexes. On my last inspection, I personally interviewed a well-educated *vakil* [lawyer] on the subject, and pointed out to him what an anachronism this conditions of affairs represented, and asked him whether it would not be possible for all educated men in the neighbourhood to make their influence so felt as to form a 'public opinion,' against which the more sanitarially inclined of the neighbours could find it impossible to rebel. He however told me whatever might be his own feelings on the subject, it would be impossible to exert the influence I suggested. At the time of my visit on that occasion, I happened to arrive just before the *toti* [night soil scavenger] had performed his ordinary occupation of proceeding round the tank, and the condition was found to be that simply of an ordinary public latrine. 'History repeats itself'—occasionally. After an interval of two years, I again visited this tank and on this occasion I interviewed another of the best known *vakils* in the neighbourhood and told him of my former visit and of my (as it was now evident) useless appeal to his educated fellow citizen. He also fully concurred with me as to the degraded condition of affairs that I pointed out, but he agreed with his predecessor that any formation of 'public opinion' was impossible. On this date I had arrived somewhat later on my inspection and the *toti* had preceded me, but his work was far from complete, and there were endless signs of recent sanitary sins. Whilst inspecting the tank the passage of urine direct into the water, and the washing of clothing at the same spot seemed to one person intent on cleanliness by no means incompatible."\*

In their Notes on this Report the Municipality concerned, whilst stating that "every endeavour will be made to bring all the neighbourhood under the private scavenging system," added as to the "Sanitary conscience" question the following definite judgment on the lack of influence of high education:—"Public opinion of this kind is non-existent." Obviously, without demonstration as to the decency and comfort obtainable from correct methods of night soil collection and removal, even well educated men are incapable of a sufficiently accurate effort of imagination to form a trustworthy "sanitary conscience." What then is to be expected of the masses who have mastered the "three R's" but have never drunk water free of risks of gross pollution, in the absence of a public conservancy system? Education must ever be an important ally of the sanitarian; but it is absurd, even with its aid, to rely upon the average man of the masses, who dwells in filthy environments, forming a conception of communal cleanliness which he has never witnessed, or of the resulting benefit to public health which he has never known.

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\*Madras G.O. No. 743 M. dated 15th April, 1905.

## INTERNATIONAL EPIDEMIC PREVENTION.

The question of the risk of infection of India by yellow fever was dealt with by the deputation of Major JAMES, I.M.S., to visit ports likely to be more largely used on the new routes which will be adopted by vessels passing through the Panama Canal. As a corollary, Dr. HOSSACK, for many years Port Health Officer of Calcutta, was deputed by the Government of India to study modern sanitary methods of dealing with seaborne traffic, as conducted in Europe. The following is an account of his paper\* :—

*Surveillance v. Quarantine.*—He pointed out that existing quarantine stations in Europe are now rarely used, as the various Governments concerned trust largely to a system of surveillance by securing the address of passengers, and require that their health state be ascertained at points of arrival; and this tendency has been largely confirmed by the Paris Convention of 1912, which permits the substitution of surveillance for quarantine. He states that it is only in the case of persons whose addresses are not ascertainable and reliable, such as emigrants or steerage passengers in the East, that detention is retained as a permissive measure.

*The Organization of a Maritime Sanitary Service.*—He particularly calls attention to the French organization of a "Commercial Maritime Medical Service." He states :—

"All doctors who wish to serve on ships have to pass a special medical examination in tropical disease and marine sanitary law. A special official register is maintained by the Chief Medical Officer of the maritime district and only those who are properly qualified are admitted to the register. They have to report themselves periodically and are *quasi* state functionaries. They themselves and also their employers make a compulsory contribution to the State Pension Fund and even when, after a time, they retire to practice on shore, they are entitled to continue their contributions. Port Sanitary Officers are recruited from the ranks of the mercantile and medical marine. The result is that marine doctors as a class are reliable men of good qualifications. I have found this to be so in my own limited personal experience. A secondary result of this is that the sanitary authorities can give considerable latitude, confident that infectious disease on boardship will be adequately treated by the ship's own staff."

Dr. Hossack further urges reform in the minor ports of India, and attention to the necessity for *improved methods of securing early intelligence of disease spread in various countries trading with India.*

*Disinfection of vessels.*—On the subject of disinfection of vessels, with special reference to rats, fleas and mosquitoes, he agrees that the Clayton disinfecting apparatus is the best available; but, in view of the fact that Professor ROSENHAIM has shown that at 5 per cent. of sulphur dioxide spontaneous ignition occurs in the presence of charcoal, he advises further experiments be made as to substitution of other gaseous agents or, failing this, ascertaining how far danger is likely to occur at 3 per cent. air dilution of sulphur dioxide, which is the full amount necessary for destruction of both rats and insects. The question is of importance in those cases where charcoal packing is

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\*"Report on a Visit to various European Ports in Reference to existing Quarantine and Sanitary Arrangements and the Measures proposed against the introduction of Yellow Fever into India."—*Indian Journal of Medical Research*, 1915. Jan. Vol. 2. No. 3, pp. 791-813.

used for insulation of refrigerators. In Amsterdam and Hamburg, he found the Rubner apparatus, which provides for the use of formaldehyde vapour under a partial vacuum,\* employed for disinfection of articles liable to be destroyed by steam. He regards the organization for dealing with inspection of vessels, and for preventive measures as well exemplified at Marseilles and Hamburg.

*Observation Depots for Emigrants.*—The dépôt for emigrants at Hamburg is described as a model town providing accommodation for 12,000 persons, and arranged so as to have divisions for race and sex. Here medical sanitation is carried out with extreme care, even a special Ophthalmological Dépôt being provided.

*Inspection of imported food articles.*—The department for food inspection in this port is also fully organized, 36 assistant doctors and 26 chemists being employed under a director and two assistant directors. They deal with such material as wines, butter, milk and butter substitutes, whilst a separate establishment deals with meats and fats. It is of international interest to note that the full organization at this port possesses "no agency to trace the ultimate destination of goods that are detained or condemned but subsequently removed."

*Economy in Establishment for Food Inspection.*—He examined the method of inspection of food stuffs, especially of meat, as conducted at Liverpool and London, and in both these places he noted an important principle guiding staff organization, which does not seem to have been adopted in Hamburg, as he there found certain sections of the staff with no more duty than might be expected "at a provincial museum." He states:—

"Great importance is paid to the absolute necessity of co-operation with the commercial organisation concerned, and one of the first consequence of this is that, when special inspection of any particular line of goods is found necessary, the detailed inspection is carried out not at the quay side, as is the preliminary rough percentage inspection, but at the cold storage dépôts themselves."

He gives an instance of overwork of the staff due to defects ascertained in particular food stuffs inspected, but this was recognized as likely to be temporary, because:—

"It was anticipated that in a very short time the strictness of inspection would, for commercial reasons, cause inspection to be done at the other end, the export centre, and that soon a little casual inspection would suffice at the import centre. *This had been their experience in the past where similar problems had had to be dealt with.*" [Italics not in the original.]

The writer would add that the principle is also safe in application to the work of Urban Health Departments provided prices of food articles are not forced up unreasonably by inspection costs, at either the place of supply or sale. It will be found that the sanitation of dairies, bakeries, slaughter-houses, mineral water factories and noxious trades, will rapidly undergo improvement at the hands of the trades concerned as a result of inspection, enforced by legislation, and co-ordination of interests; so that what may appear, at first sight, a

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\*Messrs. Manlove and Alliott, Nottingham, provided the writer with an apparatus to attach to their disinfecting machines when in the vacuum stage of operation (their B.C. 1244 of 1907), which fulfils this requirement

gigantic effort requiring numerous staffs resolves itself, in course of time, into a system of orderly routine work at comparatively little expenditure by selected experts. Such soothing facts are worth holding in mind by the sanitarian, in attempting to persuade a *non-possumus* local authority to take its first strenuous step in food and trade protection.

### THE WORLD SPREAD OF EPIDEMIC DISEASE.

In a previous Sanitation Number of this *Bulletin*, the writer has pointed to the excellent organization maintained by the United States Public Health Service, for securing rapid intelligence of epidemic diseases prevailing in countries in communication with America. In the large foreign ports are stationed expert Port Health Officers and, in the minor ports, American Consuls are charged with the duty of forwarding prompt information of disease prevalence.

The map supplied in the *United States Public Health Bulletin*, No. 64, of February 1914, showing extent of spread of cholera, plague, and yellow fever throughout the world in 1913, also throws light on the subject. The spots representing cholera are thick in the proximity of the shores of the Black Sea, in Asia Minor, the Balkans, Austria and Italy; Germany is not spotless, and even England possesses one blemish. If the now established human carrier theory is of any value, the possibilities of spread amongst the various armies now in the field and thence to civil populations cannot be ignored. Hence, the tracing of the present position of this tropical disease in Europe is of some interest.

The *U.S. Public Health Reports* of September 3rd gives facts as to world spread of epidemic disease up to the end of June 1915, and in a summary of the position it is stated :—

“On the whole, it is thought that the quarantine situation demands more attention from everyone concerned than demanded in the past, so far as cholera, typhus fevers and plague are concerned, and with the cessation of hostilities there is every indication that the work and responsibilities of the Public Health Service will be increased to an immeasurable degree.”

In short in view of possibilities, irrespective of routine international duties, it is requisite that the important functions fulfilled by Port Health Officers, even in minor ports, should be carefully co-ordinated. The matter is quite of as great importance as the protection of infantile life, which now causes solicitude to sanitarians and patriots.

In Hungary, to the end of June, there were 510 cases of cholera; in the same month, the disease was prevalent in 23 places in Silesia. In July, 1915, there were in prison camps in Germany 215 cases of cholera. In August, cases occurred in Kherson, Odessa and Theodosia in Russia; and, according to the “*Telegraaf*,” in September cholera was present in Wiesbaden, Oppeln, Breslau, Dantzig, Königsberg, Spandau, Bromberg, Hanover and Leipzig.

In the matter of plague, it is stated :—

“The disease is reported prevalent in various localities in Greece, chiefly Piræus and Saloniki. In Turkey, the presence of the disease at such places as Bagdad, Smyrna, Jaffa and Beirut is of importance. Likewise is its presence at Alexandria and Port Said.”

## THE SCOPE OF UTILITY OF ROUTINE PORT HEALTH DUTIES.

The Port Health Officer's attitude towards disease is ordinarily defensive, with but occasional necessities for adopting the offensive defensive. Consequently the capture and disarming of a single bearer of cerebro-spinal meningitis, cholera, typhus, small-pox, etc. may be regarded as a matter of little public importance. He has only done his duty; but what if he had neglected in one single instance to take upon himself that daily strain of attention to detail by which alone success can be secured. A single act of carelessness may mean the overwhelming of populations by epidemic disease. Figures supplied in a paper by Dr. Arthur Foy, Port Health Officer, Rangoon, read before the Berlin Congress of the Institute of Public Health in 1913, are not only useful in conveying some idea of the work conducted in a typical port in the tropics, but of the chances of importation of plague cases; in so far as these are significant of the proportion to total immigrants of possible bearers of infected fleas. *The nearest infected port was distant not less than four days by steam.*

In eight years, 2,224,260 immigrants were inspected physically; all cases exhibiting during the process suspicious symptoms or feverishness perceptible to the hand were subjected to the taking of temperatures by the thermometer. If this corroborated suspicion, the subjects were retained in an observation hospital, pending a decision as to cause. There were examined by thermometer 61,141, and of these 30,977 were placed under observation. Twenty-three plague cases were thus discovered, affording a ratio of 1 in 90,000 infected. Amongst immigrants arriving from known infected ports and areas to the number of 383,839 in four years, there were 19 cases discovered or 1 in 20,000.

Although Calcutta was infected in 1897 and Rangoon is the chief port in Burma in communication with it, both this port and the Province of Burma remained free of plague up to 1905. No plague amongst rats has been found on ships entering the port.

For all steerage immigrants from infected ports or ports serving infected areas steam disinfection of clothing has been systematically used and, since Burma was itself infected, the clothing of emigrants and their property was likewise treated up to 1909 and since that time those proceeding for foreign ports. Formaldehyde disinfection is conducted of articles liable to deterioration by the steam process.

Beyond plague, which is here specially referred to, by port health inspection numerous cases of both small-pox and cholera were detected and thus danger to the Province prevented. The figures quoted by Dr. Foy suffice to show that a Port Health Officer requires a sound "sanitary conscience," if the routine of masses inspected without disease detection is not to lull him to a sense of safety.

## DERATIZATION OF VESSELS.

To information supplied by his paper quoted in the preceding note Dr. Foy has kindly afforded the writer further figures of work in the Rangoon port. The following will show that whilst it is desirable, as suggested by Dr. HOSSACK (*vide supra*), that the question whether less than the 5 per cent. of sulphur dioxide in contact with charcoal is dangerous be ascertained, this amount is not only unnecessary for

destruction of both rats and insects, but it is rarely that 3 per cent. is exceeded in practice.\* Thus Dr. Fox's records show that rats were found dead after exposure to the following percentages of sulphur dioxide in 43 holds of vessels.

<i>Per cent. of gas.</i>	<i>No. of holds.</i>
1.75	2
2	2
2.25	2
2.5	3
2.75	6
3	14
3.25	3
3.5	2
3.75	1
4	6
5	1
5.5	1

The following statement shows to what extent the total hold accommodation of vessels was found inhabited by rats :—

In 1 out of 5 holds in 1 vessel = 20 per cent. of the vessel.			
1	4	1	= 25
2	5	2	= 40
3	5	2	= 60
4	6	1	= 66
5	7	1	= 71
3	4	1	= 75
4	4	1	= 100
5	5	1	= 100

In the case of 26 vessels in which the number of rats and mice was noted, the following figures were obtained :—Under 5 rats and mice, in 6 vessels ; from 6 to 10, in 4 ; 11 to 15, in 3 ; 16 to 20, in 1 ; 21 to 25, in 2 ; 26 to 30, in 1 ; 31 to 40, in 1 ; 41 to 50, in 2 ; 51 to 60, in 1 ; 61 to 70, in 2 ; over 70 in 3.

#### SANITARY EXHIBITIONS AND MUSEUMS.

The Report of the Director General of Public Health, New South Wales, shows [p. 47] that efforts towards public education was made during 1913 by the exhibition of various models presented by the Federal Government. The Report of the Medical Department for Queensland [pp. 5 and 13] states that this method of educating the public has also been elaborated in Queensland.

In the *United States Public Health Reports* (May 7th, 1915, p. 1,377) there is an account of the important hygienic exhibits at San Francisco in connection with the Panama-Pacific International Exhibition.

\*Under conditions of air tightness in holds it is possible to get 3 per cent. of sulphur dioxide ; but the writer found that in both masonry and wooden houses, carefully prepared by paper sealing, this concentration, owing to numerous air inlets such as are likely to exist in tropical houses, was difficult of attainment, when working with the Clayton machine.

Such efforts need some thinking out lest the representation of a useful subject be forgotten, and the San Francisco experience, therefore, may be useful to other promoters of sanitary exhibitions. The Special Sections provided for were, under *Social or sex hygiene*—(a) tuberculosis; (b) drugs, with special reference to harmful and fraudulent characters of patent products; (c) mouth hygiene; (d) alcohol and drug habits, contrasted with food values; (e) mental hygiene and psychiatry; (f) industrial hygiene; (g) school hygiene; (h) models of city water-supply and sewerage systems; (i) *Tropical Medicine and Hygiene*, largely illustrated by models showing improvements in villages, latrines, bathing arrangements and other items as adapted to native habits. Cuba is well represented in illustration of progress made as to malaria and yellow fever. (j) appliances illustrative of *Infant hygiene*. (k) Eugenics [probably for the first time in an important exhibition] has a large section to itself under the auspices of the "National Race Betterment Association." Here the "possibilities and methods for race betterment" are illustrated by statistics, photographs, models, engravings and charts. (l) The *Military Hygiene* exhibit is very complete and is largely the work of the Imperial Government of Japan. (m) The United States Public Health Service by models, transparencies and charts (moving and still) exhibits the mode of spread of the various infectious diseases, and affords models of institutions and laboratories and other objects and duties, in illustration of the work of the Service "in preventing and controlling diseases." An unusual but very desirable adjunct to such an exhibition is that of the two large Insurance Societies exhibit of "statistical facts amplified by pathological and other illustrations." These Societies doubtless have their own ends to gain, but they must possess the power of forcing upon the attention of the public the meaning of sanitation, as expressed in the saving of human life in its economic aspects.

In a paper on Industrial Hygiene by Surgeon J. W. SCHERESCHEWSKY\*, the use of travelling exhibitions and cinema pictures is advocated. In the more advanced areas in the tropics, it should be possible to arrange such exhibitions in one or more railway carriages, and for lecturers thus fortified by apparatus and exhibits to pass from town to town on education tours.

#### HEALTH OFFICE RECORDS.

Each Health Officer doubtless has his own methods of keeping his records, but it is rarely that a statement is available beyond office precincts. Hence the writer thinks the following extract from the Report of the Medical Officer of Health (Metropolitan Combined Sanitary Districts) for Sydney (Dr. PURDEY) may afford items of useful information in office organization:—

"There is a complete record arranged on the card-index system of every dwelling and business premises within the City, giving a description of premises; nature of business, if any; complaints made with regard thereto; notices served; diseases notified; deaths; legal action; and results; inspections. In addition, a register is kept of fifty licensed common lodging houses, a register of 900 milk vendors, a register of noxious trades, and a register of infectious diseases.

"A daily return is obtained from the Registrar of all deaths in the City; a register is also kept of all prosecutions and Police Court proceedings.

"With regard to the routine clerical work of the office of the Metropolitan Medical Officer of Health, this is carried out by Mr. V. Roberts, a clerk of the Department of Public Health.

"On receipt of notifications of infectious diseases forwarded by the Town Clerks of municipalities, these are stamped with the date of receipt and with respect to disease. The name of the municipality to which the case should be debited is then filled in at the top of the notification, and the patient's name entered in the index.

"As all cases of infectious disease admitted to hospitals have also to be notified through the local authority in whose district the hospital is situated, these have to be checked with notifications from general medical practitioners.

"Particulars of all notifications are then entered on cards, different colours being used for each disease, and these cards are arranged under the different metropolitan and extra metropolitan municipalities.

"Special Report Sheets are also kept, to show the incidence of infectious disease in each district.

"A record is also kept of the milk supplies of infected households. This is also arranged alphabetically on the card index system, a separate card being allotted each dairyman or milk vendor.

"A special note is made of a report of infectious disease from a dairy or the premises of a milk vendor in order that immediate action may be taken.

"Whenever an unusual number of cases occur among the customers of a dairyman or milk vendor, a list is submitted to the M.O.H. Lists are also made out for the information of the P.M.O., Department of Public Instruction, when several children attending the same school are found to be suffering from an infectious disease.

"Record is made in cases of infectious disease taking place in inmates and nurses of institutions and hospitals.

"In case of notification of typhoid fever a special form has to be filled in by the Sanitary Inspector of the district where the case has occurred.

"Returns of deaths from infectious diseases and from all causes among infants under one year are received from the District Registrars each week. These have to be checked as regards registration numbers to ascertain that none have been omitted or included twice. On a return of a death from a notifiable infectious disease it is necessary to ascertain by reference to the Infectious Disease Card Index whether it has been notified."\*

#### MEDICO-LEGAL OR PUBLIC HEALTH DUTIES.

In the Appendix to the Medical Report on Western Australia for 1914, Dr. Cyril H. SHEARMAN gives an account of the work of the Laboratory attached to the Public Health Service. The arrangements for this part of the organization are in the transition stage, necessarily, common to several State methods elsewhere than in Australia. The Bacteriologist and Pathologist is saddled with medico-legal duties. In this instance, the total cases attended to were small, but even so such work is ordinarily inconsistent with Public Health demands—although there is a stage in progress in the tropics when for economical reasons the combination must be tolerated. Duty of such a nature as to involve, as it often must, the life or freedom of criminal subjects places at intervals a special burden upon the Laboratory worker, in which one or other duty must be temporized with. This is added to by *personal attendance being required at Courts*. In India, where medico-legal work in each Province is of a most extensive nature, a certificate giving

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\*New South Wales. Report of the Director General of Public Health for the year ended 31st December, 1913, p. 92.



facts solely as to articles forming an exhibition or case is furnished by the official dealing with such duty—the Chemical Examiner to the Government of the area concerned. This is admitted as legal evidence, whilst the local medical officer in Government employment who is the local medico-legal expert may be, and ordinarily is, examined both by the prosecution and defence as to the significance of the Chemical Examiner's evidence as to the exhibits, in relation to all the facts of the case. There is no reason to think the absence of the Chemical Examiner defeats justice. The local medical officer as a Government servant obtains no fee, and in practice it is so well recognised that his evidence is impartial that it is rarely that either prosecution or defence elect to summon further medical evidence; and thus the not always edifying spectacle of doctors differing in courts on vital medico-legal points is equally rare. A similar ruling in some of the Colonies would conduce to laboratory skill being economized in favour of Public Health demands, until medico-legal work assumed sufficient importance to require the appointment of an expert devoted solely to such duties.

#### TRAVELLING FACILITIES FOR SANITARY STAFFS.

It is a matter of importance in dealing with sanitary staffs that they shall have facilities for rapid transit within the area under their charge. This secures financial economy as to number of men employed, in that time spent in slow travel may be more usefully utilized in rapid enquiry and action where epidemic diseases are concerned. In towns, it is possible that a Sanitary Inspector provided with a pony, or humble "bike," may have a tendency to useless speed with resulting less careful enquiry as to local conditions than advisable; this abuse can however be duly repressed by supervising officers.

Where inspecting officers of any grade are concerned, the means of rapid locomotion is desirable even in towns. In epidemics, the attachment of mounted orderlies and the free use of telephones will greatly aid rapid action.

In rural areas, the arrangement by which both subordinates and officers are provided with special allowances for maintenance of horses, or other mode of quick transport, cannot be dispensed with in the interests of economy of finance and personnel.

The Government of India has ruled that special facilities for advances of pay shall be allowed to certain grades of its officials to enable them to purchase motor cars. More recently, these facilities have been extended to officers who would be content with motor cycles.

Petrol will, doubtless, in other parts of the tropics bring about the abolition of "hammocks" in favour of motors on practicable roads, and of slow sailing schooners for inspection of riverine and island stations. Inspection by aviation is a dream of the near future.

#### THE CLINICAL LABORATORY

The clinical laboratory in hospital administration is a well acknowledged item in the present day, and Sierra Leone, according to the Annual Report of the Medical Department for 1914, has since 1913 undertaken work of the nature required seriously. The Laboratory was under the charge of Dr. YOUNG and Dr. BUTLER for six months,

respectively. The (West Africa) Yellow Fever Commission, represented by Dr. DALZIEL and Dr. JOHNSON and Mr. BACOT also used the laboratory.

As a matter of routine "examinations of the urine, faeces and night blood of every patient admitted has been insisted upon." The records of laboratory work are maintained in special forms "which have proved useful in that they keep all the laboratory returns for each patient together." These forms are arranged so as to exhibit results of examination of material as follows:—1. *Examination of Blood* for (a) malaria, (b) trypanosomes, (c) microfilaria, (d) leucocyte counts. 2. *Examination of* (a) urine, (b) faeces, (c) sputum, (d) pus from different sources. 3. *Reactions*—(a) typhoid and paratyphoid, (b) Wassermann. 4. *Examination of* material gained by gland puncture and scrapings of ulcers and leprosy nodules. 5. *Post mortems*.

Staphylococcal vaccines were prepared and, in one case, "the effect of treatment was watched by estimation of the phagocytic index."

In 634 examinations for malaria the following results were obtained:—Subtertian 214, quartan 58, benign 2, subtertian and quartan 13, negative 328; showing malaria parasites present in 287 or 46·6 per cent.

A total of 964 "night bloods" and 7 "day bloods" yielded microfilaria in 9·7 per cent. In the Freetown Jail, they were present in 11·8 per cent. of 118 prisoners.

Of 986 patients examined, ankylostome ova were found in 30 per cent. In the last quarter of the year, by washing and centrifuging about a drachm of each specimen the percentage rose to 44·4 per cent.

Tubercle bacilli were found in the sputum of 27 of 100 patients examined.

These statistics furnish a clue to general local conditions in Sierra Leone. It was not possible to differentiate tribes and races of patients examined.

#### WESTERN AUSTRALIA.

The healthy tendency of the present day sanitarian to regard his duties as intimately connected with the economic advance of the area as to which he advises the authorities holding the purse strings, is well exhibited in the "Annual Report for 1914 (Western Australia) on Medical, Health, Factories, Early closing." The Commissioner of Public Health expresses the value of Applied Hygiene in figures illustrating the saving of life, or discusses cause of failure to save life, in relation to the social well being of the people and to the demands upon public funds. In his official function as Principal Medical Officer and Commissioner of Public Health, he represents both Curative and Preventive Medicine. He has however no hesitation in pronouncing which of these branches is of the greater importance to the State. Curative Medicine in Western Australia is so well provided for that there is a hospital bed for every 225 of the total population. He makes no lengthy disquisition on the subject, but furnishes the information that "the cost per head of populations in 1914 was:—

					s.	d.
Hospitals	..	..	..	..	4	11½
Health	..	..	..	..	0	7·2
Factories	..	..	..	..	0	·79

*State of Western Australia Annual Report for 1914.* [Tropical Diseases Bulletin. Vol 6. No. 9.]

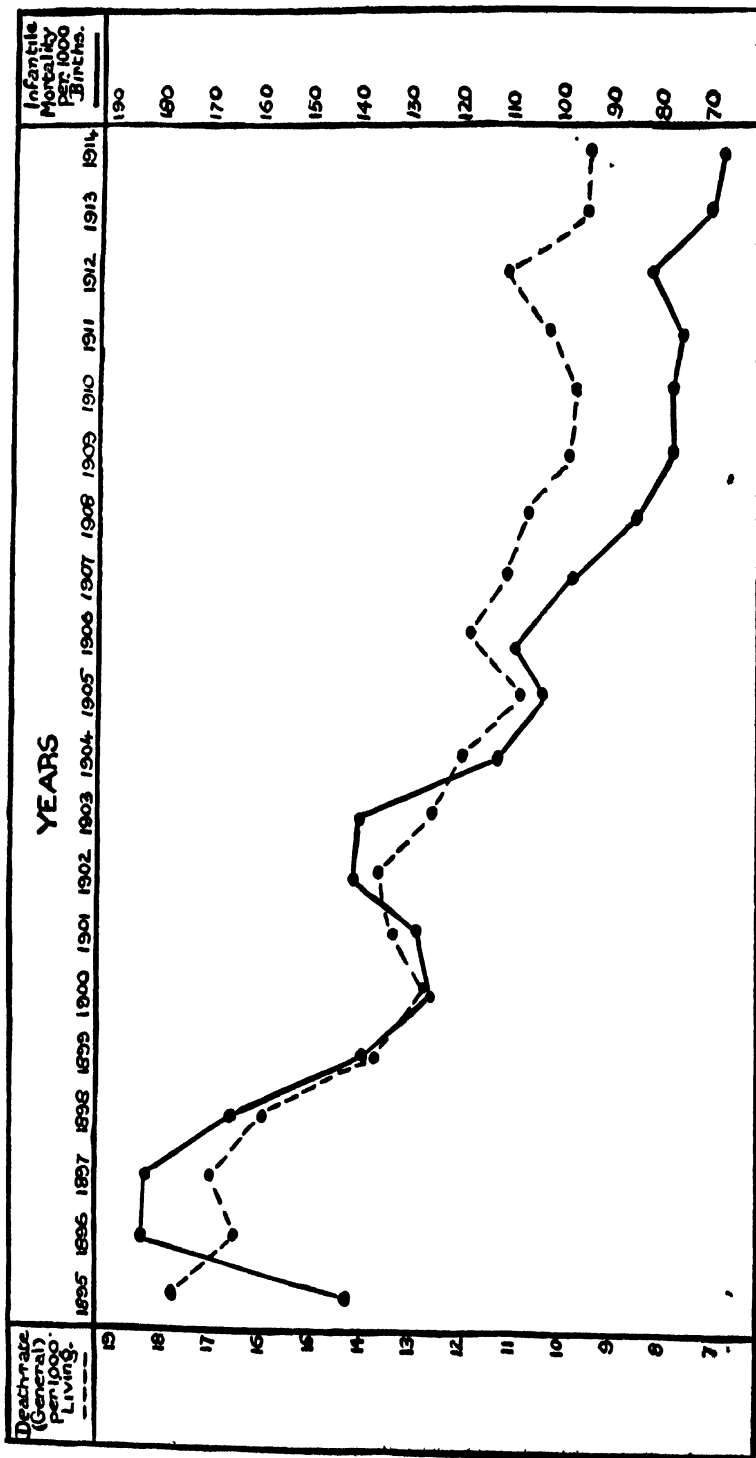


Chart showing the decline of the death-rate (general), and infantile mortality-rate. Years 1895-1914.

This statement of facts is followed by a single brief but expressive comment :—" It will be a creditable time when the cost of prevention more equalises the cost of cure."

Under the section of the Report devoted to Public Health, he more specifically points to the position which Preventive Medicine must occupy in State administration :—

" Scientific and legislative effect is in relationship as cause and effect. The question of the numbers and health of the community are questions at the root of the existence of the State, in almost as great a degree as the question of the State's ability to guard itself in war. The one time question of defence from war is now the equally national one of defence from disease."

Figures for income and expenditure under the local Public Health Act are afforded; but as the items are confined to administration, it is not possible to judge how far sanitation has been aided under Sanitary Works, or under what other heads the bulk of the expenditure has occurred. Hence, the writer does not quote these otherwise important figures.

That such funds as have been available in Western Australia have been judiciously spent in sanitary interest is sufficiently evident from the remarkable chart furnished, which shows a steady improvement through a series of years not only in the general death rate but in that delicate test of the environment and habits of the population— the infantile death rate. It is a chart that the Sanitary Officers responsible in the past and present may well regard with pride.

Pursuing his theme of State economic value of Applied Hygiene, Dr. HOPE gives the following calculation, estimating the losses by the single disease typhoid :—

" The value of a life of a person to a state is worth .. ..	£300
" Allowing a very liberal discount of 50 per cent., the value of 247 lives may be set down at £150 each .. ..	£37,050
" Taking the period of incapacity of those cases of 20 years of age and over, i.e., 2,238, and assessing the cost of illness and loss of wages at £16 each .. ..	£35,808
	<hr/>
	£72,858

The Government of Western Australia has for the past 18 months offered antityphoid vaccine gratis to all applicants.

## SANITARY RULINGS.

## QUARANTINE.

Small-pox epidemics have been so little known in Australia that vaccination has not been much sought after by the average inhabitant, with the natural result that on this disease appearing a public scare is possible. The legislation on the subject at one stage of the smallpox epidemic of 1913 in New South Wales was also not free of panic as, notwithstanding sanitary advice to the contrary, the Federal Government insisted upon "declaring Sydney a quarantine area within a radius of 15 miles." Ultimately, combined sanitary advice and representations on behalf of commercial interest secured removal of the measure. Quarantine was then substituted by the following ruling :—

"Each person leaving the State signed an undertaking to report himself to the Health Authorities of the State to which he proceeded, in the event of his suffering from any sickness within twenty-one days of his leaving New South Wales." \*

## TUBERCULOSIS.

The South African Union Government Tuberculosis Commission, in advising notification of tuberculosis, thus discuss the advisability of cognizance being taken of one or both forms of the disease :—

"It is true that a patient is only dangerous to others when actually discharging living tubercle bacilli, and that the extent to which he is a danger depends, other things being the same, upon the quantity and the manner of the discharge, but while, according to these criteria, the pulmonary form of the disease with much tuberculous expectoration, is the most dangerous to others, it by no means follows that other forms of the disease may not under suitable conditions, be discharging infective material and be dangerous to associates, as, for instance, the dejecta in a case of tuberculous disease of the bowels.

"There is, of course, the alternative of ignoring the particular form of the disease and deciding the question on the basis of its particular state ; that is to say whether it is in the condition of discharging infective material—the so-called 'open tuberculosis,' or is not in an infective condition—the so-called 'closed tuberculosis.' It is, however, by no means easy to decide exactly when the condition of a patient is not infective, and in any case it is both unreasonable and inadvisable to place the onus of such a decision upon the notifying medical man ; and as no such responsibility could be placed upon a layman, dual notification would have to be discarded. . . .

"It is, therefore, preferable to require *every* case of clinically recognisable tuberculosis to be notified, leaving it to the medical officer of health to decide in each case, upon a consideration of all the attendant circumstances, the degree of danger existing for others. By 'clinically recognisable' we mean displaying some other signs or symptoms than the mere reaction to the tuberculin tests."

These considerations led them then to advise that "every case of clinically recognisable form of the disease" be notified.

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\*Report of the Director General of Public Health, New South Wales, for the year ended 31st December, 1913.

## A PRIVATE HOSPITAL ACT.

New South Wales possesses, since 1908, the power to secure control of all private hospitals throughout the State, both as to structure and management. In 1914, there were 451 applications for licenses. Examples are given of the working of the Act during 1914, showing it has a considerable scope of utility.

In instances where septic puerperal cases have occurred, notices are issued prohibiting admission of further cases, pending the enforcement of certain regulations. Additions and alterations to structure are zealously watched; as there is a natural tendency to increase accommodation with more regard to cost than sanitary dictate. In others, the admission of patients beyond the number for which the building is registered is forbidden. Some of the wall papers employed were found on analyses to contain arsenic; and the following Amendment of one of the Regulations under the Act was enforced, "owing to the fact that, on analysis, it was found that certain samples of paper sold as sanitary paper contained arsenic." The regulation as amended now reads :—

"The inner walls, partitions and ceilings of every room or ward used for the reception of patients in a private hospital shall have a coating of either paint, cement, plaster, limewash, varnish, or 'sanitary paper' (provided any paper or paint used does not contain arsenic or any other material injurious to health) or such other substance as will admit of effective disinfection."\*

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\* loc. cit.

## TREATMENT OF WASTE.

## DISPOSAL OF FAECES.

The following is a description of a method of dessication of faecal matter advocated by Messrs. STAMP & POWELL, Engineers, Melbourne.

"The method of disposal of night-soil in unsewered districts generally recommended has been to discharge the night-soil from the pans into shallow, narrow trenches, and cover it with soil. This necessitates securing a fairly large area of ground in a well-isolated position, so situated that no rivers, creeks, etc., which might be used for domestic purposes, will be contaminated. With the increase of population and spreading out of settled localities, suitable sites within reasonable distance of the townships are becoming most difficult to obtain. In other localities the nature of the soil or the very hilly country render it unsuitable, and the want of an efficient method for the destruction of night-soil has been keenly felt. During the year, however, Stamp and Powell, Engineers, Melbourne, introduced apparatus which was claimed to be capable of drying the night-soil and converting it into a powder, which was inodorous, sterilised, and of considerable value as a manure. A favourable report has been received from Hobart in connection with a similar plant, and Willoughby Council arranged with the firm to instal one near Chatswood. The apparatus consists of a revolving jacketted desiccator fitted with internal steam pipes. The night soil is admitted to the body of the desiccator, steam turned into the jacket and pipes until the liquid is all evaporated by contact with the heated surfaces, the solid residue being put through disintegrators, bagged, and sold as fertiliser, the value of which is quoted at £3 per ton. The offensive vapours given off in the desiccator are drawn by vacuum pumps through a condensing coil, and finally discharged under the furnace, and with the exception of some local effluvia caused by emptying the pans into the desiccator, the process is carried out without nuisance. The polluted water used for washing the pans is treated with the night-soil, and the pans are thoroughly sterilised by steam before being again put into use. The condensed steam from the desiccator is passed through a filter bed, and finally disposed of on a small area of well broken-up ground. The apparatus is capable of being erected in section to treat large or small populations. The proprietors erect and maintain the plant, cleanse and steam the pans at a charge per pan of 2½d."\*

The merit of the above machine would seem to the writer to be in the idea of revolving the mass, so as to secure that it is exposed in successive thin layers. Its extensive use would of course depend not so much upon the original outlay on the machine as upon the cost of maintenance of steam in the time required—and as to this no data are afforded in the Report. The extent to which town sweepings could be employed for the purpose would be, in places where coal and wood is expensive, an important point.

## DISPOSAL OF SEWAGE BY DILUTION.

PETTENKOFER held that it was safe to discharge untreated sewage in a river, if it did not exceed 6·7 per cent. of its volume. Later, STEARNS, of the Massachusetts Board of Health, held that the proportion should not exceed 2·8 per cent. The Eighth Report of the Royal Commission on Sewage would permit of discharge of sewage

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\*New South Wales. Report of the Director General of Public Health for the year ended 31st December, 1913, p. 42.

into rivers, after screening, provided the volume of sewage be not greater than 1 to 500 of river water. As time has advanced, therefore, the tendency has not been towards favouring this method of sewage disposal.

Fifteen years back, Chicago noted the fact that the Lake was required to dispose of the sewage of the city as well as furnish its water supply. It was thought that if the sewage were diverted other possible sources of contamination of the lake as a water supply would be negligible, and unfiltered water could be delivered. As to sewage disposal by dilution, although it had been unsuccessful in the lake, it was thought results would be all that was desired in a river. For the latter purpose, extensive works were constructed for diversion by means of a canal to the Chicago River. The proportion allowed for was 3.3 cubic feet of water for the dilution of the sewage of each one thousand people. Of course, experts were produced for and against the scheme, and much valuable bacteriological work was effected, showing the rate at which microbes decreased *pari passu* with distance from point of entrance into the stream. Experience, however, has now shown that the process of simple dilution is unsatisfactory; and, although, in certain areas of the tropics, the changes in organic matters in river water are probably accomplished quicker than in temperate climates, the lessons taught by Chicago experiences are not without applicability—there being a tendency to trust to dumping of untreated night soil in rivers in certain of the Colonies.

A Committee of experts (G. A. SOPER, New York, A. J. MARTIN, London, and John D. WATSON, Birmingham) studied the subject of Chicago sewage disposal by dilution for 13 months. From an abstract of their conclusions, given by the *Engineering Record*, September 25th 1915, it is found that they reported that “not an arm or a branch of the Chicago River which include present treatment looked clean.” These experts, having regard to the expensive works already completed, have shaped their advice so as not to abandon the principle of disposal by dilution, but they demand extensive preparatory measures. They advise restriction of the volume of both domestic sewage and trade waste fluids, so as not to exceed the volume the water can absorb. They hold that intercepting screens and settling basins must be extensively employed. Granted that the interception of sewage, recognizable as such, is fulfilled, they believe that the hope of excluding all sources of pollution from the lake, which is still the source of water-supply of the city, “is unpracticable, but that the placing of a large territory under central sanitary control is practicable.” Consequently, they require that the whole water supply be subjected to efficient filtration.

Chicago is, therefore, faced with the fact that its expensive canal and intercepting sewers of only fifteen years back, intended for disposal of sewage by dilution, cannot fulfil the requirement of final and safe disposal of sewage. Nevertheless, regarded as the main works for diversion of sewage from the lake, they will consort with the more advanced scheme now proposed.

#### DUMPING OF RUBBISH.

Owing to a sudden change of the incineration system under which rubbish disposal was effected in Chicago, it became necessary to dump



loads of rubbish in an old clay hole excavation so close to inhabited areas as to be likely to produce nuisance. Pending the starting of the pre-existing system, 60,000 tons of rubbish were treated as follows:—

The rubbish was “dumped into vats, which were filled within 2 feet of the top. The garbage was then covered with a 1 per cent. acid solution, equal parts of crude hydrochloric and sulphuric acid being used, and was allowed to remain under this treatment for 12 hours. The liquid was then drained off through openings in the bottom of the vats and when the garbage had become fairly dry, it was picked up by an orange-peel bucket, operated by a crane, and loaded on cars for removal to the hole for dumping. The garbage was distributed over the bottom of the excavation in a layer 1 foot thick, then a layer of ashes  $1\frac{1}{2}$  or 2 feet thick was spread over the garbage. This process was continued, layer by layer, in the same manner and proportion of garbage and ashes. . . . The action of the acid is simply to retard decomposition of the garbage until the ashes can become thoroughly mixed with it. In a few months the garbage has become thoroughly disintegrated, and the fill is dry and inoffensive.”\*

#### RUBBISH DISPOSAL.

The necessity for careful study of currents before disposal of rubbish, night soil or sludge in the sea is advised, is illustrated by the following extract from the New South Wales Medical Report for 1913:—

“With regard to the taking of refuse to sea, experience in the Metropolis has demonstrated that with certain tides or winds, even when the garbage is taken to a distance of five miles from the harbour heads, portions have been washed up on certain beaches, an occurrence which is objectionable to the residents of any seaside district, but doubly so at such places as Bondi and Manly, where there is so much surf bathing. If this practice of taking refuse to sea is continued the distance from the shore at which it is dumped should be at least 20 miles.”

In one locality known to the writer in south India, according to the season of the year, a steady current runs north along the coast for a period and south for another period, with a brief neutral interval; so that any direct flow out to sea is out of the question within the influence of the current.

#### TRADE WASTE FLUIDS.

In New South Wales, George's River has been “extensively polluted from a wool washing establishment at Liverpool as well as the water of Botany Bay and Cook River. The proprietors have been required to pass the fluids through settling tanks and straining tanks, and subsequently to launch them on to ploughed land for downward filtration. Watching and periodical analysis by the local authorities are requisite in guarding the results.”

The writer suggests that in case the factories concerned will not go to the trouble of collecting the fatty scum of the wool washings for the manufacture of lanoline, a profitable industry might be undertaken by the local authorities dealing with the matter. It is possible for trade waste to be wasted.

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\*U.S. Public Health Reports. 1915. Sept. 24. Vol. 30. No. 39.

## SANITARY WORKS.

## SUBSOIL DRAINAGE.

In the Department of Land Records and Agriculture, United Provinces, India, Mr. E. A. MALONEY, I.C.S., Commissioner of Agra, publishes a "Note on the level of the water in the subsoil of the Gangetic plain,"\* which claims attention from the point of view of malaria prevention. In the first part of the paper, he makes the usual generalization that one third of the rainfall is disposed of by "run off," one third by soakage to the subsoil, and one third by evaporation. He estimates as to the last factor that in the Gangetic plain "it will probably be a fairly accurate estimate that 10 inches of rainfall will on an average be used up in transpiration and evaporation from land that is under crops or trees, and that an amount somewhat less than this will be evaporated from uncultivated land." After adverting to direct flow and the usually acknowledged upward capillary flow from a subsoil, he makes a special point of a similar action downwards "from any source of supply existing at the surface of the earth, and it seems probable that a very large proportion of the subsoil water finds its way down in this manner." He then considers the influence of wells in lowering the subsoil water table, and states that "if at any point any considerable amount of water is drawn from the subsoil by wells it is clear that the rate of flow through the subsoil must be diminished. This diminution will diminish the hydraulic gradient which will in time affect the water level." This however is an assumption not usually accepted in so far as the rate of flow *above* the point of withdrawal is concerned, as at this point the hydraulic gradient is increased. However it can be agreed that "in time" the diminution will affect the water level. He then advances his main argument under cover of a concrete case:—

"The former had state of the tract of country in the Aligarh and Muttra Districts now served by that Branch canal, is an object lesson of the great damage that may be caused by allowing the subsoil water level to sink excessively. Had it not been possible to bring canal water to that tract, a great deal of good land served by wells would have relapsed into poor dry land with no source of irrigation."

And here he arrives at his main argument—

"A similar result might be caused by drainage. There is no doubt that to drain a swamp pleases the people of the locality, as it renders good land available for agriculture; but the hidden results to the agriculture of the country dependent on that swamp for a considerable portion of its subsoil water supply may far exceed the advantages obtained by the drainage operations.

The moral and remedy to which Mr. Maloney would point are thus stated:—

"It is a well-known fact that it is possible to reverse the flow of an artesian well by carrying up the well tubing to a suitable height and pouring in water. It is certain that any ordinary well could be made to perform the same function by diverting surface water into it; but of course the muddy surface water would soon choke up the well, to say nothing of the danger of pollution of the drinking supply. To obviate these difficulties it is clear that the water would have to be filtered before being passed into the well.

“It is probable that it would be a cheap and effective way to sink tube wells in the beds of existing swamps well into the sand beds of the sub-soil, and then fix at the top a filter which would prevent the tube being clogged and also prevent contamination of the sub-soil supply. The filter bed being at the surface could be cleaned or renewed without difficulty. In this way considerable additions could probably be made to the sub-soil supplies.”

There seems to the writer in these arguments a want of appreciation of the fact that were subsoil drainage of a swamp carried out, it does not follow that the subsoil water need be lowered to a depth to endanger wells, and that the real function of drainage is not in removing the total water above the first impervious layer but *limiting its maximum rise*; and that the country in the neighbourhood of a swamp need not be “dependent on that swamp for a considerable portion of its subsoil water supply,” for the reason that it ordinarily either must imply a clay bound basin refusing to part with its surface water to the subsoil, or is itself a revelation either of the proximity of the subsoil water to the surface or of a communication therewith by a fault or depression. As to the remedy, Mr. Maloney forgets the better permeability of cultivated soil as contrasted with uncultivated, and the use *in situ* of irrigation; but granting the full value of his suggestion of falling of the subsoil water table in time as an effect of withdrawal, the proposal of “reversed wells” in swamps assumes that the water, partly surface and partly interstitial, of the upper soil of the mixed organic and inorganic structure of swamps, is at a different level to that of the subsoil water. This need by no means be the case; from the first impervious layer supporting the subsoil water to the pool on the surface of the swamp, the interstices of the soil may be filled with water. Mr. Maloney in condemning drainage ignores the fact that both the experiments of the Agricultural Department at Pusa and Madras, point to a great future in combining subsoil drainage with irrigation in securing soil aeration essential to vigorous plant life. Mr. Maloney judiciously does not furnish any data as to the cost of a “reserved well” scheme that would have any real influence upon subsoil water contents. Whilst it is quite possible that the lowering of the subsoil water table in the Aligarh and Muttra districts was due to irrigation by wells (in spite of the water being employed within the area whence derived) it is certain that his theory is not applicable, as the title of his article implies, to the Gangetic plain as a whole, the mass of subsoil water in which must be largely due to substreams of rivers, hidden by alluvial deposits, bearing water from distant points. Doctrines such as those advanced by Mr. Maloney seem to the writer to be in the interests of neither agriculture nor malaria prevention.

#### THE WATERPROOFING OF CANALS.

Percolation from canals intended for irrigation purposes not only implies enormous waste of useful water for irrigation but has long been recognized as a fruitful cause of waterlogging of soil, and its attendant favouring of mosquito propagation. “Indian Engineering” [September 11th, 1915] reports a discussion of this subject at the Punjab Public Works Department Congress of 1915, when Mr. F. A. CURRY drew attention to certain experiments twelve years back by Mr. R. J. KENNEDY, C.I.E. That officer held “that the lining of

channels to prevent loss of water was within the range of practical politics, though the best form of lining for India had to be determined. He was further of opinion that action should first be taken with the water-courses and smaller distributaries, and he produced calculations based on his own observations to show that a greater saving could be effected by a given expenditure, if the outlay were incurred in a number of small channels rather than in the main channels." The Irrigation Commission of 1903 agreed with Mr. KENNEDY, but were inclined to the belief that attention "should be first directed to those schemes of government channels in which the loss was known to be very great, and where waterlogging was most pronounced." They advised experiments accordingly, which have not apparently been undertaken, until Mr. CURRY very fortunately, in the interests of both irrigation revenue and malaria prevention, devised a series of trials of materials which he described in his paper. One can only hope, with "Indian Engineering," that the subject will attract the attention of the Punjab Government and be worked out fully.

#### ARTESIAN WELLS AS SUPPLEMENTS OF CANAL SUPPLIES.

In the course of work on the Sirkind Canal, it was found that the foundation of a super-passage, sunk 6 feet below the canal bed, for flood water was seriously interfered with by strong springs. To relieve pressure from these, bored wells were sunk; with the result that the springs were found to be under a pressure giving a level "not only higher than the full level of the canal but higher than the river at the canal offtake  $7\frac{1}{2}$  miles up stream. RAI BAHADUR BAIJ NATH, Executive Engineer in charge, decided to attempt the use of this flow to supplement the canal water.\* He sunk one hundred pipes at 200 feet intervals along the canal, or fifty to a mile. At an expenditure of Rs. 12,500 he thus secured additional water of the value for irrigation purposes of Rs. 13,500." The same officer (on instruction to attempt to supplement the water from wells in the Hoshiapore District) has advised that this can be secured "by sinking pipes inside existing wells to lower water bearing strata which exist at no great depths."

The writer refers to Rai Baij Nath's work as a further commentary upon Mr. MALONEY's paper quoted in a preceding note, in that he believes that the latter officer would probably have, in sinking existing wells to deeper strata, a sounder way of securing irrigation water than attempting methods favouring the waterlogging of soil. Rai Baij Nath's experience also points to the possibility of water now lost in the soil by percolation being to some extent utilized, pending the development of the water proofing of canals and channels, by lifting to canals subsoil water along their course by means of tube wells actuated by electricity (where such power production is feasible) as is now pursued near Amritsar. Where intermittent duty is aimed at, the writer suggests it is probable that electricity production, on certain canals, without the aid of extraneous hydraulic power, would not be a hopeless problem if water discharged for irrigation were used.

\*Indian Engineering, 1915. August 7.

## WATER WASTE PREVENTION.

Mr. MADELEY, the Special Engineer in charge of the recent improvements and extension of water supply and sewerage systems in the Madras City, has recently written an article in the "Local Self-Government Gazette" of Madras, which has the virtue of condensing in a few paragraphs useful information on the subjects of water waste prevention. This has been translated in the vernacular by order of the Madras Government (1200 M., 6th August 1915), and distributed free to District Municipal Councils and ratepayers. The following are extracts therefrom :—

"Metering every water service and charging for the water used is an excellent way of determining and checking waste. . . .

"This system has been adopted to a considerable extent in America. In large wealthy cities, where the consumption per head is high, it is perhaps the most economical way of limiting waste. It has the further advantage of providing the most equitable basis of charging for water, as each household pays for the actual quantity consumed in the house.

"The weak point of the system is that it takes no cognizance of leakage in the mains ; but used in combination with the waste water meter system described below, it forms the most efficient known method of checking leakage and waste. . . .

"In estimating the amount of this expenditure we may take the average cost of a meter, including meter pit and fixing, at Rs. 100, and assuming 40,000 connections to be made eventually in a town of the size of Madras :—

## Capital cost—

Then the first cost would be 40,000 meters at	Rs.
Rs.100 .. .. .	40,00,000

## Annual expenditure—

Staff, materials, and replacing worn parts of meters, 40,000 meters at Rs.3 .. ..	1,20,000
Interest on Capital, Rs.40,00,000 at 4 per cent.	1,60,000
Depreciation at 15 per cent. .. ..	6,00,000
Total ..	8,80,000

"Under the house service regulations recently passed by the Corporation of Madras, meters will be used only for those houses where a "first-class" service is required. In such cases the householders will bear the cost both of installing and of maintaining the meters, so that no burden will be thrown on the general tax-payer.

"House-to-house inspection has often been found very effective in reducing the waste of water. . . .

"Another fault of the method is that, while a reduction is effected in the waste from cisterns, taps and other fittings inside the house, yet it fails to discover the invisible underground leakage, which occurs in the mains, house pipes and connections.

"For these reasons house-to-house inspection alone is not sufficient in Indian cities, but it is a very useful auxiliary. . . .

"Where the whole system has failed, the taking up and replacing of all pipes and fittings may be adopted with advantage, and will produce excellent results. . . .

"But the cost of this method is very great, and in cities where most of the pipes are believed to be watertight and serviceable, there would be no justification for incurring the great expense. . . .

"Again, though an excellent system would be secured with few sources of leakage, yet some plan of maintenance would still have to be devised to ensure the ready detection and remedy of losses due to waste, and to such leaks as would develop in course of time.

"In the waste-water meter system the city is divided into districts, and the mains are so arranged that, by closing a few valves, the whole of the

water required for any district is supplied through a pipe on which is placed a waste-water meter. This form of meter records continuously the flow of water through it on a diagram attached to a drum which is caused to rotate by means of a clock.

"The flow which takes place between midnight and 4 a.m. will be mostly leakage and waste.

"The diagrams for the whole city are brought in daily or weekly, as may be thought best, and from them the Engineer is able to see at a glance in which districts water is most wasted, and on these districts is concentrated the energy of the staff. . . .

"In order to localise the waste, an Inspector conducts a night inspection. Beginning about midnight, he sounds and closes all stop cocks on the connections, closing the sluice valves on each branch as soon as all the stop-cocks on that branch have been shut down. The time is carefully noted in every case, and, by referring to the recorder diagram, the effect of closing each valve can be ascertained, and the points of leakage located within narrow limits; their positions are determined more exactly by means of stethoscopes.

"The premises where excess water is being used are inspected during the next few days, and notice is served to remedy any defects which may be found. If the leakage has been traced to the main or house connection, the road is opened up, and the fault repaired. . . .

"The waste-water meter system is very generally used throughout England.

"The effect in Calcutta has been to reduce the consumption under constant supply from 22,000,000 to 17,000,000 gallons per day, a saving of 5,000,000 gallons per day or nearly 23 per cent.

"The result of adopting the system in Bombay is shown by the following extract taken from the Administration Report of the Municipal Commissioner for 1905:—

"It having been ascertained beyond doubt that a very large quantity of water was leaking from the water mains and service pipes, it was deemed expedient to increase the staff engaged in this work and form a special branch whose duties would consist of the detection of waste and the location of defects upon the water mains, service pipes, fittings, etc. Since the 1st of September, 1904, this system has been followed with considerable success. Many underground leaks and defects, some of a very extensive nature, having been brought to light and repaired, consequently the supply and pressure in several districts has been much improved."

"As an example of the application of waste-water meter system, it may be stated that in the scheme prepared for Madras, the city has been divided into 134 districts, each provided with a separate waste-water meter. In addition to the waste-water meters, the city has been divided into 13 bulk meter districts, so that, in ordinary working, when the quantity of water supplied to one of the 13 bulk meter areas is found to be excessive, the sources of waste can be traced by means of the waste-water meter.

"In conclusion, it may be stated that water is a valuable commodity, and must be treated as such to derive the full benefits from a pure water-supply. It is just as important to close every water tap as soon as sufficient water has been drawn and stop every leak, as it is to switch off the current in a house supplied with electricity, when the lights and fans are not required."

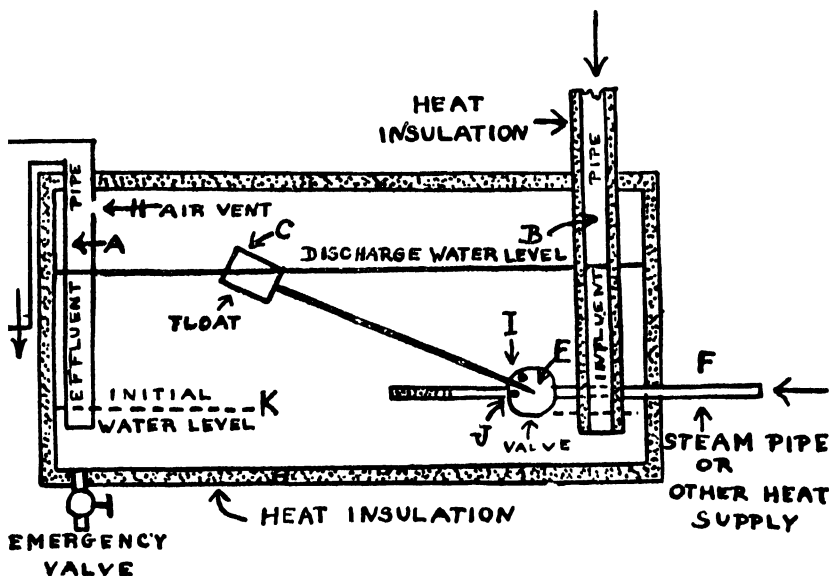
#### SEWAGE DISINFECTION.

At the Saigon Congress of 1913, one of the speakers pointed to the necessity of so constructing the discharge points of scuppers and latrines on board ship that a stream of filth shall not be possible on the ship's side. He stated that, in loading and unloading ships in port, more especially when the stage is reached of the hulk being well above water, men in boats alongside dealing with cargo are apt to get their hands defiled with typhoid or cholera matter, and thus become foci for infection of ports. As a result of steamers conveying much

passenger traffic on small rivers or on much used routes on lakes, where the water is employed for drinking and washing purposes, dangerous defilement is liable to occur if direct discharge of the faecal matter of crews and passengers be allowed.

In railway trains, in certain tropical countries, on long journeys faecal matter is disposed of by water flush closets so as to be deposited on the permanent way. Irrespective of contempt of aesthetic prepossessions of labourers, it is evident that, if the railway be within the watershed of public supply waterworks, a serious danger of spread of typhoid and cholera is risked.

Under such circumstances, contrivances allowing of mixing the faeces with standard quantities of lime hypochlorite might be employed, but a process that will subject the whole mass to heat and only then permit of passage of faecal matter must be of special value. Leslie C. FRANK, Sanitary Engineer, U.S. Public Health Service, thus describes an apparatus for securing this end. It must be understood that when employed on railways the shutting off of steam, in the locomotive engine of a train prevents discharge at unreasonable points, such as within railway stations, and for this purpose certain storage room is provided in the automatic reservoirs.



Device for Sewage Disinfection in Vessels and Railway Coaches.

"The operation of this device is as follows: Assume that the initial water level in the tank is at K. The steam valve E is in its closed position and the influent pipe B is submerged below the water level; in other words, the influent pipe B is always trapped, even at the times of minimum water level in the tank. The entrance of sewage into the tank through B causes the level of the water in the tank to rise gradually and to carry the float upward with it. The float arm, however, is pivoted freely upon the steam-valve disk and therefore does not turn on the steam by revolving the disk until it engages the pin I; that is, until the liquid in the tank has reached a certain predetermined height, dependent upon the position of the pin I. When this height of water is reached the steam is gradually turned on. For a time the entering steam is immediately condensed and gives up its

heat to the water. The water thus becomes heated at a rate dependent upon the rate and pressure of the steam discharge. As the temperature of the water approaches the boiling point the steam ceases condensing in the water but rises through the water and collects in the chamber space above it. At about the boiling point of water, or a trifle above, the pressure develops in this upper space and gradually forces the sewage up and out through effluent pipe A.

As the liquid discharges the water level and the float descend. The steam, however, remains turned on full until the float arm engages pin J, when a slight further descent shuts off the steam. The level of liquid at which the steam is shut off and at which discharge from the tank immediately ceases may be predetermined by the position of the pin J. The small hole H is provided to enable the air in the tank to escape as the sewage enters. The relation of the size of this hole to the total cross-section areas of the steam influent openings is such that only a very small percentage of the steam entering through pipe F can escape through hole H, and therefore pressure develops in the tank practically as fast as if hole H were not present. This hole may be replaced by a simple thermovalve, which will be open below say, 80° C. and closed above that temperature, but the percentage of steam escaping through H is so low that it is doubtful whether the inclusion of such a valve is warranted.”\*

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\*U.S. Public Health Reports. 1915. Jan. 1. Vol. 30. No. 1.



## LANDS AND BUILDINGS.

## THE WIDTH OF A FIRST CLASS ROAD IN A CITY.

There has been considerable discussion in Calcutta as to what should be the width of the Russa Road, which will form an important link between the city and the Tollygunge suburb. The history of the scheme as stated by "Indian Engineering" [September 18, 1915] shows that the first proposal was that there should be "an 18 feet tram track." In July, 1914, "it was resolved that the roadway be 66 feet wide, the tram track forming parts of the roadway, and that the footways on each side be 17 feet wide planted with trees. By January 1915, "it was resolved that the roadway be 54 feet wide, and there be footways on each side of 23 feet width." Professor GEDDES was now consulted. He advised—

"The lay-out of the road should make provision for running tram-cars at express speed; next, that the maximum width possible of footway be arranged for—not less than 17 feet on the one mile of Russa Road widening and 20 feet on the wider extension southward; third, that central tramway standards be employed, with cars on each side; fourth, that the tram-track be of sleeper construction with grass strips, and provided with islands at the halting places."

The necessity for speed for trams is regarded as important if the suburb is to attract the commercial classes. Dealing with the subject, the Chief Engineer of the Calcutta Corporation expresses his opinion that the maximum rate for the trams should be  $19\frac{1}{2}$  miles per hour with stopping stations at 250 increasing to 300 and 400 yards as the population decreases. He then states:—

"Two trams measure 17 feet over all. If central standards are used 2 feet must be added, making 19 feet. It seems to be decided that if the trams are on a separate track some form of low railing is advisable which would require 2 feet more. A single side pole with the arm takes up nearly as much room as a central standard; so that if there are no span wires from the foot-paths, the tram-track, if on sleepers, will take about 21 feet. If 24 feet is regarded as the minimum width of the two roadways, the foot-paths cannot be more than  $15\frac{1}{2}$  feet wide."

The full width of the roadway according to the decision of January 1915 being 54 feet, the arrangements for the tram-track leaves 23 feet for the footways on each side. This size of footways, instead of  $15\frac{1}{2}$  which would be the size possible after following Professor GEDDES' plan in other respects, the Improvement Trust concerned holds is very desirable, but the decision 54 feet is incompatible. "Indian Engineering" would combine the varying views as follows:—

"Thus with Professor Geddes's idea of what the roadway should be (and we think he is right) and the Board's idea of what footways should be (and we think they too are right) we should have had for the full width of the Russa Road a minimum of 115 feet instead of 100; and it is this *minimum* we should like to see suggested by Government, if the question has not been already closed."

## GENERAL PRINCIPLES OF TOWN PLANNING.

The following opinions were *inter alia* expressed by the Chief Engineer of the Board of Estimate and Apportionment, New York City (Nelson P. LEWIS) at the recent International Engineering Congress at San Francisco.\* He states that the first step in town planning should be

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\*Engineering Record, 1915. , Oct. 2, p. 415.

the possession of a complete topographical survey so that the full necessities and possibilities of a case can be fully recognized at the outset, especially in such important details as future lines of drainage, railways, roads, also parks, and, if there be a waterfront, the localities best suited for pleasure and commerce, respectively. He considers a contour map or model of the site helpful in deciding such details.

In the arrangements of streets, he warns against steep gradients and the adoption of stereotyped straight lines.

In the matter of tree planting, he states as follows : —

“The importance of trees in a city cannot be over-estimated. Their position should therefore be one of the street details to receive careful study. The practice of placing them immediately back of the curb is quite general, and where buildings are placed on the street line it may be necessary to do so in order to give them space of growth. If they are placed between the sidewalk and the building line, however, the street acquires an added dignity and appears to be wider than where the trees are placed along the curb.”

He insists upon the necessity for effective legislation to prevent the sacrifice of public to private interests, and to secure consistent schemes of development and improvement, by affording guarantees that when once a design is inaugurated giving a special character to a district, it shall not be invaded “by industries, uses or occupations inconsistent with that character”; “the prohibition of the erection of structures either permanent or temporary which will offend the eye, or of anything destructive of amenity” is urged.

In financing town planning schemes, he presses attention to the question whether an improvement will be of general benefit to the inhabitants of a town (such as the possession of buildings in localities for public activities and amusements) or a special benefit merely to a portion, so that the cost of improvements “to be assumed by a town will be less in proportion to the amount of special benefit resulting to the particular locality.

#### UNHEALTHY BUILDING AREAS.

In New South Wales under Section 55 of the Public Health Act—

“Land is usually proclaimed unfit for building purposes, either because it is low-lying and subject to inundation by tidal or storm water, or rendered unhealthy by swampy conditions due to accumulation of drainage, or has been used for the tipping of offensive garbage. As soon as the land is proclaimed, a notice is served on each owner, and the conditions considered necessary to render the land fit for building purposes are specified.”

There would apparently be no difficulty in working this Section were it not that “unfortunately there exists no obligation on the part of the owner to notify the Department of his intentions to build on the land.” In consequence, the law is much evaded by owners selling sub-divisions of badly drained portions, which are at once utilized by the poorer classes.

Obviously, to render the Section of real utility, it is necessary to secure a ruling that no building shall be erected without consent of the Local Authorities in the area concerned, and giving power to cause prompt demolition of a building erected without consent.

## THE DESTRUCTION OF PRICKLY PEAR.

This subject evidently is not without importance in Queensland, where a travelling Commission (Harvey JOHNSTON, M.A. and Henry TRYON) have dealt with it since November 1912. They have recommended that systematic experiments should be undertaken with the plant, such as to make alcohol, paper and fodder. They also remark that "the wild cochineal used have proved very destructive to *Opuntia monacantha*."

A discovery of a method of utilizing commercially the masses of vegetable organic matter the chief fault of which is that it is defended by thorns, or, failing that, of securing its cheap destruction, would be of great sanitary importance to very large areas in India. The immediate surroundings of village sites in the Deccan and South of India are frequently so overrun by masses of prickly pear that much valuable ground is rendered useless for cultivation; perflation of the inhabited area is prevented, and shelter for snakes, rats, dead animals and human faeces is afforded.

To remove the prickly pear by manual labour is a slow and expensive process and, if not so conducted as to destroy the roots, is of no utility. The plant has been used with much success as manure by securing its decomposition after cutting in deep pits; but the thorns so resist destruction by natural means that they become a danger on manured ground to the cultivator and his cattle. In famine the fruit is largely used by the people for food. The prickly pear has also been used as fodder after the removal of the thorns but, as the process can rarely be absolutely effective (although its successful employment has been and must be possible in careful hands), the writer has received woeful accounts of deaths of cattle due to undigested fibre causing intestinal irritation, plus thorns found on post-mortem examination in the abdominal organs, whither they had wandered after the manner of needles.

In one matter, however, he has seen prickly pear used with advantage. A cement plastered wall will not take paint evenly till it has set perhaps fully six months and, in hospitals or sanitary buildings, it is often not desirable to wait for this period as a penalty for having used cement plaster. If the plant be boiled, a tenacious fluid is obtained which, if painted over a reasonably mature cement wall as a preparatory coat, will secure the desired result *much better* than size or silicate preparations. This little fact, if properly pursued commercially, might prove of economic advantage.

In the Canary Islands, the prickly pear before the introduction of aniline dyes was a plant of value, as it supported and probably still does the cochineal insect. Knowing this, the writer in 1895 advocated, as does now the Queensland Commission, the use of the cochineal insect to destroy prickly pear and, incidentally, to secure an industry that would then, and especially at the present time, be valuable. But he found that the same ground had been trodden in 1862 by others, without permanent success. He then suggested the use of certain parasitic growths, which appeared to him to cause death to the plant. The question was referred by the Madras Government to Sir George WATT (Economic Reporter to the Government of India)

and Sir Alfred BOURNE (Professor of Biology, Madras University) with the result of extracting much interesting information from these experts as to the difference between the wild and the commercial varieties of cochineal insect, and the apparently important preference of the latter for the red flowered opuntia (*O. cochinellifera*) as against the yellow flowered (*O. dillenii*). As to the parasitic method of destruction all that occurred was that the plant disappeared down to the roots but was again able to flourish. From Australia also about this period came a method, which was patented, of injecting the plant with a preparation, understood to be of an arsenical nature; but here without special treatment the roots also survived. So that a subject that is of much sanitary, and might be of commercial, importance both in India and Australia is still open for research. The Indian Research Fund might find in it a useful field for employment of the Rs.50,000 returned by certain Bengal District Boards, which had been allotted by it for experimental "jungle clearing."



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See also under Disease Headings.

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For the benefit of recipients of the Bulletin, who wish to make a Card Catalogue, or to preserve a consecutive record of the references on any subject, galley proofs [‘*Korrekturbogen*’; ‘*Première*’] of the Quarterly Lists of References (printed on one side of the page) can be supplied at the subscription price of **Two Shillings per annum**. They are obtainable from the beginning of 1914 onwards. Application should be made direct to the Bureau.

**AMOEBIASIS (including Entamoebic Dysentery and Liver Abscess).**

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## **DYSENTERY (Bacillary and Unclassed).**

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